JUL 16 1924

TELEPHONE ENGINEER

VOLUME 28 JULY, 1924 NUMBER 7

STABILITY of EARNINGS

AND STROWGER AUTOMATIC

WHEN the securities of a public utility company are given a high value in financial circles, there is usually one main reason—stability of earnings. Those securities most in demand are backed by a record of steady returns from year to year.

Nothing indicates the success of any enterprise better than the standing of its securities. Those of companies operating Strowger Automatic equipment enjoy high favor among investors because their earnings are not affected by continually rising operating costs.

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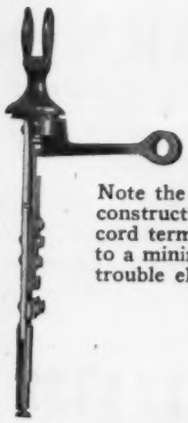

IN THE STEM

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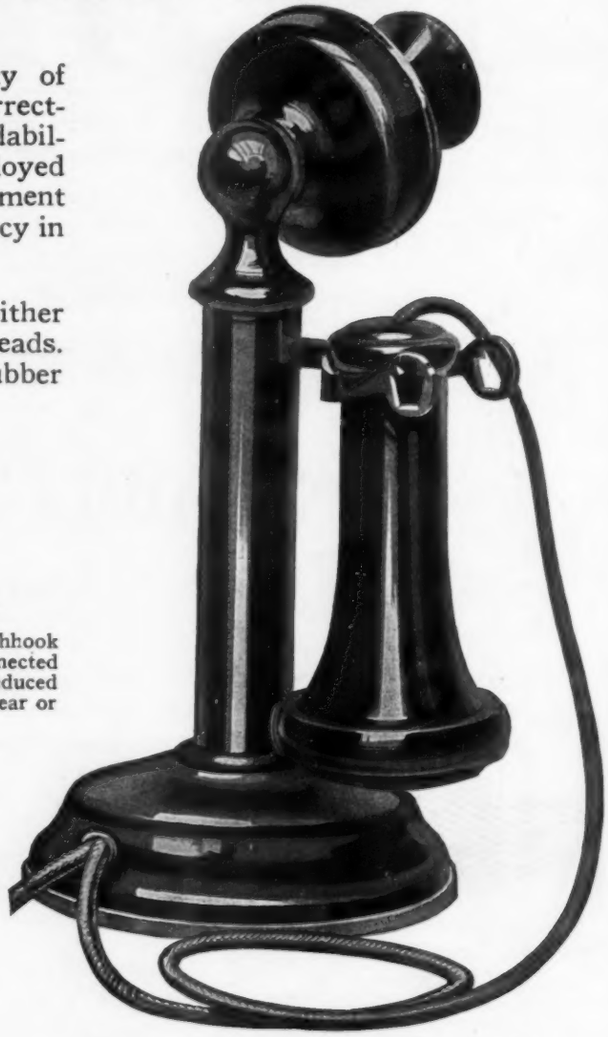

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UNIFORM SERVICE RULES.

The proposed adoption of uniform service rules in California is well worth study in other states. A committee of the California Independent Telephone Association, acting in conjunction with the Telephone Engineer of the railroad commission, has been studying the situation and several conferences have been held. It is understood that the rules have been pretty well agreed upon but they have not yet been published.

Particularly among Independent companies, the rules regarding applications for service, use of lines, time and methods of payment, have grown up, depending somewhat upon local conditions and more upon the ideas of the management of the company. There has been no uniformity and there have been many misunderstandings between companies and subscribers who have moved from other exchanges. Uniformity of rules and practices would have avoided much of this difficulty.

There will, of course, be objections made to proposals to change rules. It is not always easy to change a practice to which the public have become accustomed. Many managers may be loath to change rules which they consider of special benefit in the conduct of their business. If the adoption of such rules are to be successful, there will need be general observance of the attitude of one committee member who is quoted as having said that, while the rules differed from those enforced by his company, he was willing to make the change for the greater benefits that would be secured through uniformity.

The publication of the California rules will be awaited with interest. When published, other state associations might do well to study this plan, in which California seems to be the pioneer, and see if it can be profitably applied in their states.

THE MAN WHO COULD NOT GROW

John Fixer—which is not his real name, but 'twill serve—is an employe of many years' experience with a certain telephone company. When the company operated a local battery system, John took care of the switchboard and much of the outside trouble, at the same time keeping an eye on the other things around the place. Most of the employes of the company broke into the game and what they know of the business was largely learned under John's tutelage.

The company grew and as its old system was no longer adequate, new common battery equipment was installed and the entire plant modernized. This change made necessary the employment of a man who would spend his full time in the office caring for the switchboard, testing trouble and directing the work of repair and installation. Quite naturally, John was selected for the position. It was a promotion earned by long years of service to the company.

When trouble developed—and as usual, there was plenty of it during the "wearing in" period—John readily enough learned to clear it, but there was a new practice of routine testing recommended by the manufacturers which was outside John's experience. Evidently John did not think it amounted to much for he never began to apply it. When questioned about it by his manager, he had the usual alibi: He hadn't started it yet because he was too busy with trouble.

As the months went on the trouble did not decrease as it was expected to and the installation of routine tests was put off again and again. Now the manager's patience is exhausted and he is looking for a new man to take the job. When the man is found, there will be no place for John except to go back to the old job with less responsibility than he formerly had in the old system. Another man will have lost his chance for advancement because he could not grow with the job.

There is real tragedy for John Fixer in this story. It marks the turning point in his life. He is, even now, marked as a man who has reached his limit. Yet how many men in life are in the same position as he. There are John Fixers in managers' chairs, and John Fixers outside the railing looking for jobs. There are John Fixers in every department of every business because they can not grasp the application of new ideas which differ from the ways in which they have always done the job.

It is a misfortune to have lived a life in which opportunity never came, but it is a real tragedy to have lived a life in which opportunity came and later passed on because the individual could not adjust himself to the responsibilities brought by it.

ADVERTISING THE REPEAL OF MESSAGE TAX

A certain telephone company situated so that a large volume of toll traffic terminates in a nearby

large city, is already advertising the fact that the message tax on toll messages has been repealed and that, since July 2nd, there has been what is, in effect, a reduction of cost of 25 per cent in cost of station-to-station calls to the larger city.

While the average telephone user is probably aware that his past toll bills have included the federal tax, he has not thought of it as being separated from the charge for the message. As far as he is concerned, the repeal of the tax amounts to a reduction in rates. This fact can be used for effective publicity directed toward stimulating the use of the toll lines. Judicious advertising should result in increased toll revenue.

TEAM WORK WITH UTILITIES

This is the attitude of Mayor Kendrick, of Philadelphia, toward public utilities:

"Our ambition is to serve the people, and we are willing to cooperate with and give deserved assistance to all public service corporations desiring to improve their service. Their success is vital to the community at large."

NO DIFFICULTY IN FINANCING DEVELOPMENT

Several things have occurred recently to support the opinion that the present time is very favorable for telephone financing. Money rates are low, there is a considerable amount of money available for investment and the former prejudice against telephone securities largely has disappeared. Bonds and preferred stocks of telephone companies, to say nothing of the recent large common stock issue of the American Telephone and Telegraph Co., have been absorbed by the investment market, and still more can be placed.

All of these things indicate that no difficulty need be anticipated by a telephone company in securing funds for its development, if it proceeds in the proper way. But, first, the company must have its house in order. It must not only have the property back of its present and proposed issue, but it must have the earning power to provide a reasonable surplus over the dividend or interest requirements, including the new financing. It must be prepared to show the value of its property and its earning power by reports of reputable engineers and accountants. When it can show these evidences of competent management, it will find bankers and investment houses willing to listen to its plans and to assist in its financial arrangements.

A company which needs money for development, and which can make the proper showing will find no better time to carry out its proposed financial arrangements. One which can not make such a showing never will find a suitable time until it adjusts its affairs. For such companies, the time to commence is now.

A NEW ISSUE IN STATE CONTROL

A new issue has been injected into the problem of state regulation of utilities: Indiana state authorities have filed a petition in the state courts asking that a receiver be appointed to wind up the affairs of the Indiana Bell Telephone Co. This petition, filed by the attorney-general of the state, is said to allege that the Indiana Bell company is a dummy corporation, that its directors are dummies and that such a corporation has no right to engage in business in the state.

The Indiana Bell Telephone Co. was formed a few years ago to take over the business of the Central Union Telephone Co. in Indiana. Its last annual report shows a corporate deficit of nearly two and one-half millions of dollars as a result of its operations. The company has been before the public service commission of its state in a number of individual rate cases and about a year and a half ago the commission, of its own motion, began a state-wide investigation of its affairs. Some increases in rate were granted, but they were deemed insufficient and the case was carried to the federal courts. A recent decision in the U. S. district court enjoined the commission from interfering with the inauguration of new rates and, practically, gave the company right to establish its own rates.

The case has been bitterly contested and the relations of the company with the American Telephone and Telegraph Co., which owns all of the common stock except directors' qualifying shares, have been a particular point of attack. The present petition for a receiver is but another in a long series of legal actions that have been brought.

This matter is of interest in other states because many of them have corporation laws similar to the one invoked. Bringing into question, as it does, the fundamental relation between the parent Bell company and one of its subsidiaries, a purely intra-state corporation, the case becomes one of much general importance and will, no doubt, receive close attention from other quarters than Indiana.

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Economical Cable Plant

Some of the Engineering Features Involved in Laying Out an Economical System of Cable Distribution for Small and Moderate Sized Exchanges—Methods of Relief and Multipling

By E. K. Goss *

In the engineering of outside plant for small exchanges, the same fundamental principles should be observed that are used in the larger exchanges. The pole line, cable and wire construction should be done in a standard manner. Although the matter of interruption of service in the small exchange is of somewhat less importance than in the larger exchanges, and the application of less expensive construction methods is of importance, the life of any plant is directly dependent upon the design and workmanship of the plant during construction, and the standard of maintenance during its life. The engineering of the plant and the selection of the materials and the type of plant installed is where the real economies in the plant will lie.

Small Plant May Be Engineered on Closer Margin

Because of the limitations and the very moderate growth of the small exchanges, the plant should be engineered from a facilities standpoint more closely than in the larger exchanges. If it is necessary to rebuild or extend the plant because of the necessity for additional facilities, replacement of deteriorated plant or some local regulations regarding the location of the plant the first thing to consider is the growth expected. In order to determine this growth it will be necessary to make a survey, to determine the prospects for immediate business, and what may be expected in the future. The preparation of a commercial survey for large cities requires somewhat complicated methods, involving considerable detail, but the survey for a smaller community or rural district may be made without extensive studies. However, the fundamental principle will be the same. The area to be surveyed should be divided into sections of uniform market conditions. This will consist of a consideration of the character of the territory, the nationality of the people, the conditions affecting the value of property, the rental values and tenants and the areas occupied by business and industrial plants. A record should be made of the existing subscribers and a record of each family in the area including subscribers and non-subscribers. A forecast should be made of the increase in population, and the reason for the actual growth of the area, and an estimate made of the future growth of the area. An estimate should be made for the growth of the area, over a five-year period, allowing one year for the obtaining of materials and the actual completion of the construction work. Such a survey will form a basis for plant extensions with a view to the ultimate development of the territory. Plant extensions should only be made with the idea in mind of the ultimate development of the territory in a step-by-step process.

Three Methods of Providing Relief

The next point to consider is the manner in which relief is to be provided. In designing any plant, it must always be laid out with a well defined plan for future relief. There are three methods of relief which may be selected. (1) Relief may be provided over an alternate route, (2) By rebuilding upon the same route, or (3) By placing additional facilities on the same route. The placing of relief on an alternate route, as shown for an almost ideal case in Fig. 1, is probably the best and most used of these methods. This, however, is dependent upon local conditions, and no set rule can be laid down for the selection of the method of relief, and each exchange should be given separate consideration. The advantage of providing relief by means of new construction along an alternate route is that the alternate route may be designed to serve as a means of providing plant in a new development which will require facilities for service. This method will also offer facilities for distribution, and will provide two or more routes for service in case of emergency. It is economical in a number of cases, as it is generally possible to turn the distributing cables around and feed them into the new feeder cable on the alternate route with very little rearrangement. This is probably the biggest point in favor of this plan, as it is often the case that not only the feeder cable is in need of relief, but the distributing cables are also working at full capacity. The distributing cables are generally filled first, and by diverting this load into a new feeder cable at some cross point sufficient relief will be obtained to allow the original feeder cable to care for the ultimate development of the territory which it is designed to serve. This same manner of relief may be used when the new feeder cable has become filled, and a system of aerial feeder cables will be provided which will increase the flexibility of the system.

The choice between reinforcing and replacing of plant in order to provide relief is dependent upon the cost rather than the local conditions. The layout of the smaller cities is such that it is often impracticable to rebuild on an alternate route and therefore the reinforcement or replacement method must be used.

Underground Construction Sometimes Not Economical

In providing relief, the question of underground conduit and cable comes under consideration. Due to the initial cost of underground construction and the idle and non-productive parts of the plant, the choice between aerial and underground construction is usually easily decided. In small exchanges underground conduit construction should not be considered unless right-of-way or local regulations prohibit the use of aerial construction. It is economical to design a feeder pole line plant to carry two full size aerial cables, the next step being underground construction. By using the alternate route method of relief, underground construction may be postponed for a number of years, which will result in a large saving in plant investment. Also, in planning a plant of this type, the aerial feeder cables can be so placed as to avoid their removal at the time underground is installed. This is done by placing the aerial feeder at right angles to the conduit route, or if parallel to the underground route, sufficient distance away to allow its retention in plant, as a subsidiary feeder to the underground plant. If, however, it is necessary that underground construction be placed, a study should be made of the type and size of conduit to be used, and also the location of this

* Paper presented at recent telephone plant conference at Purdue University.

conduit. Great care should be taken in the selection of a street for the placing of this conduit. A street should be selected which will give the best possible facilities for feeding aerially from this conduit with the idea of future development of the area. The conduit should not be placed in alleys except where it is impossible to place it in the street without high initial cost, due to existing paving. If paving does exist, and it is in a residential section, the conduit may be placed in the grass plot between the sidewalk and curb line at a lower cost than in the street. If the conduit is placed on the streets it is accessible at all times, is less subject to changes, to closing of alleys, etc.

Conduit Should Be Built for Ultimate Needs

The conduit should be designed to care for the ultimate growth of the territory which it is to feed, as extra ducts can be provided at slightly more expense, whereas it is a difficult and expensive matter to reinforce the run after it has become congested. The matter of section lengths for underground conduit should be given careful consideration. The manholes do not necessarily need to be located at the intersection of alleys, or streets, at other than conduit junction points, while it is advantageous to place them at these points. The matter of economy in placing the underground cable with regard to reel lengths and splicing should be taken into consideration. As a general rule conduit sections between manholes should range from 500 to 580 feet in length, but not over 600 feet, except in unusual cases. This will allow the placing of a full reel length of full size cable on one reel. The section lengths should be of uniform lengths if possible, in order that one emergency reel of cable will suffice for the system, and will not be of a special length. It is not essential that the manholes be located at the alley or street intersections at which aerial feeders are to be placed, as the lateral conduit may be placed in the main trench and turned into the feeder leads by means of bends and single or double duct lines.

It has been found that concrete manholes are more economical and more satisfactory that brick manholes. The concrete manholes can be placed at much less cost, varying from $25.00 to $75.00 less, depending upon the size of the hole. The concrete manhole decreases the size of excavation, and also eliminates the use of high priced, skilled labor in construction.

Selection of Size and Gauge of Cable

In designing the cable plant, there are two things to consider, the size and gauge of cable to be placed. The size of the cable will depend largely upon the existing working lines and the growth estimated by the commercial survey. In the smaller exchanges where the growth is not so rapid, cable may be placed which will have a fill of 60% at cutover, or upon going into service, or as high as 65% according to the nature of the territory. In the large exchanges where the growth is greater, and more rapid, a 50% fill at cutover is generally advisable. In new additions in which growth is expected to be large within a very short time, the percent of fill should be lower.

Marked Economy in Using No. 24 Ga. Cable

In determining the gauge of cable to be used, a map should be set up first, showing the location of the transmission limits for the limiting loop resistance of the exchange, without the aid of local battery, through the use of 19, 22 and 24 gauge cable. This boundary will, of course, exclude the magneto rural lines. It will be found that the greater portion of the aerial cable plant may be constructed with 24 gauge cable in the average small exchange, as this gauge cable can be used without difficulty on loops up to 2.1 miles from the Central Office. This will result in a considerable saving in construction costs, because of the lower price of the 24 gauge cable, and because of the lighter construction methods that may be employed.

Cable vs. Open Wire

In the designing of plant, the question often arises, especially in the smaller exchanges, and in the outlying districts of the larger exchanges, which shall be placed, aerial cable or aerial wire. This question is decided entirely by the growth and the local conditions of the area fed by the plant. If the growth of the territory is slow, but the ultimate requirements large, it would be desirable to build the aerial wire lead, and replace it at a later date with cable. It would not, however, be economical to place an aerial wire lead if there were five existing circuits, and a possible future development of five additional circuits within a period of three years. This would be a place for cable for extension. The matter of maintenance will affect the choice of aerial cable or aerial wire. If the maintenance cost of the open wire would equal the added cost for placing cable, the aerial cable should be placed.

Use Plenty of Terminals

In the matter of distribution, the frequent use of distributing terminals is advisable. These can be placed at frequent intervals, depending on the number of drops to be fed from each point. The 11 pr. and 16 pr. terminals are of sufficient size to permit proper distribution and multiplying. It is better practice to install more terminals of the smaller size than infrequent spacing of larger terminals, which necessitates stringing wire between terminals and parallel to the cable. Care should be taken in multiplying terminals on the same cable, to insure a margin for individual lines, multipled pairs for party line loading, and to have all pairs in the distributing cable appear in terminals. A simple arrangement, and one that generally applies is as follows:

Assume a 50-pair distributing cable, Fig. 2, extending through six (6) blocks, equipped with six 16-pair terminals and eight (8) 11-pair terminals.

Start at the outer end of the cable with the core pairs 1-16, and mutiple five pairs in each succeeding terminal toward the feeder cable, cutting out the entire 50 pairs in the outer three blocks. Then repeat this distribution for the remaining three blocks. When relief is needed, the cable may be cut at the end of the third block, and carried into a new feeder cable on an alternate route, and it will not be necessary to change the distribution of the terminals, as each section is laid out as individual units.

Study Pole Sizes Carefully

In a small exchange, the selection of the size and class of pole lines is one of very great importance, as this is a large portion of the outside plant investment. A careful study should be made of the load to be carried by the pole, and the size of pole placed, which will carry the load. If this is done, the type and size of the poles in your plant will be decreased considerably; 20, 25 and 30 ft. of the "C" and "D" class poles should be used wherever possible. In special cases only should 35 ft. poles be used. By doing this, the pole cost will be greatly reduced, and the initial investment in the plant will be smaller. By placing the cable and wire leads at 16 and 18 ft. grades, the necessity for larger and higher poles is eliminated, except on heavy toll or joint lines. A good rule to use in the matter of poles is to place only that amount of pole in your plant which you are able to use during the life of that pole.

The type of plant to be designed for extensions should be considered from a practical and economical standpoint. Local conditions, such as bad tree conditions, will vary and determine the practicability of the type of plant to be used. Municipal regulations may affect the type of plant. Foreign wire interference and right-of-way conditions will also affect the type of plant.

Highway Rights and Duties

An Impartial and Two-Sided View of the Relations of Utilities on the Highways, Toward Each Other and Toward the Public—Interference and Co-ordination

In the Editor's opinion, this is one of the clearest statements concerning public rights in relation to interference and co-ordination that has ever been made. It is deserving of careful reading and study by all classes of utilities which occupy the highways as an incident of serving the public.

By Hon. David F. Simpson *

Formerly Associate Justice, Supreme Court of Minnesota

Mutual rights and duties always afford an opportunity for controversy. Individuals easily and continuously sense their rights—with much more difficulty and much less frequency they comprehend their duties. Utilities, in these respects, do not differ greatly from individuals. Indeed, it is commonly, although we will agree unjustly, believed that utilities magnify their own rights and minimize their own duties even more than individuals. Conversely each party sees very clearly and fully the other's duties towards himself, but is a bit hazy as to the other's rights. A common understanding of mutual rights and duties is the first requisite to the elimination of controversies growing out of any relationship.

Moreover, such common understandings must continually be developed, because new situations involving mutual rights and duties are continually arising. Social progress, economic development, has and will always involve curtailment of freedom of individual action and enlargement of obligations to others. The price we must pay for the conveniences, luxuries and opportunities of our modern civilization is the loss of the unlimited rights of the primitive man. Even the rights guaranteed by our Constitution are not unlimited rights. Freedom of speech does not include inciting treason or lawlessness. The pursuit of happiness must be conducted along ordered lines. We no longer have the right to create a monopoly, to combine to restrain trade or control prices. We must not indulge in unfair competition. We are told the kind of house we may not live in, the garb we may not wear, the food we may not eat, and the liquids we may not drink or transport.

Public utilities have been specially involved in this trend of narrowing rights and broadening duties. It is making them in fact, as well as in name, public service corporations. Increasing public needs and demands create both opportunities and limitations. The enforced rubbing of elbows of utilities meeting diverse public demands, requires continual readjustment of methods and practices. Every such readjustment has been attended with trouble, irritation, controversy and conflict.

No more fertile field for such conflicts exists than highways, with continually increasing, diversified uses. Admittedly, the use of highways in common by power and communication utilities renders necessary different methods and practices than those which were proper when one utility had the sole use of a highway. The necessary readjustment of methods used on highways occupied by different utilities is still in the formative, controversial stage. There is as yet no common understanding of the mutual rights and duties. No legal principle or rule has been uniformly established or uniformly recognized to govern the common use. Yet from a consideration of the nature of highways and the basis of their permitted use by utilities, such a governing principle and rule may be evolved, and such rule will undoubtedly in time be uniformly recognized and established.

New Uses for Highways Have Developed

A highway is a public way, common to all the people. Originally a highway was devoted to travel as the meaning of the term way indicates. It is traced—through the primitive footpath or trail, a way for pack animals, a road for animal-drawn vehicles—to the modern highway devoted not only to travel in many forms, but as well to a variety of other uses incidental to the progress of the arts and the multiplied wants of man. Public roads are a good index of the degree of progress of the people using them. Advancing civilization makes on them its impress. Pavements, water mains, drains, telephone and light and power lines, tell of modern conveniences and facilities, of freer communication and of enlarged outlook.

These uses of the highway were not known or dreamed of when highways were first created. But it has become the settled law that the public easement is not limited to the particular methods of use in vogue when the easement was acquired. The public right of use keeps abreast of the public need. The new method of use need only be compatible with other recognized uses and the rights of the abutting free-owner. While methods of use have thus changed, the nature of the use remains unmodified. It has always been and must continue to be a use for the public, for the common service of all the people. Use of a highway by utilities, while of advantage to owners of the utilities, is nevertheless a public use, permitted and justified solely by a resulting service to the public.

Utilities Entitled to Liberal Consideration

As utilities occupy highways only by permission of the public and to render a service to the public, the permission should be broadly given so as to permit the greatest service. Therefore, grants from the state of the right to occupy the streets should be without priorities and conditioned only to prevent unreasonable interference with travel and other permitted uses. Minnesota, consistently with this principle, by statute permits "any water power, telegraph, telephone, pneumatic tube or light, heat or power company" to use "public roads for the purpose of constructing, using, operating and maintaining lines, subways, canals or conduits for their business," only requiring that "such lines shall be so located as in no way to interfere with the safety and convenience of ordinary travel over the same." Other states, either directly by the Legislature or through subordinate bodies, have like permission.

Unless the grant of the right to use the street creates by its terms some inequality in such right as between utilities, it seems clear on principle that no such inequality may be inferred. Neither the utilities themselves nor commissions nor courts should attempt to create superiorities because of some opinion, entertained by them, of the relative importance of the different services.

When the advent of electric street railways wrought havoc with the ground returns of communication lines, it was claimed in the resulting liti-

* Address delivered at the 47th Convention of the National Electric Light Association at Atlantic city.

gation that as electric railways directly aided travel—the primary highway use—their rights in the street were superior to the rights of communication utilities and that the latter could not restrain conductive interference with ground returns; and several courts approved of this claimed superior right. But it was also announced in these cases that a telephone company, through permission given it to occupy a street with its poles and wires, did not acquire a proprietary right in an undefined uncharted portion of the earth through which its return current passed, and that another utility owed to it no duty to avoid conductive interference with such grounded system. This is the controlling principle in these cases, rather than an inequality of rights in the street.

Analyzing Utilities' Various Claims to Preference

Power companies have also claimed superior rights for their transmission lines over communication companies because the power was used for lighting streets and in some cases for propelling street cars. But this claim, while plausible, has no sound basis. The streets are for the use and benefit of the public. The public, for its benefit, permits a telephone company to place poles and lines on the street. A power company or street railway company using the street solely under like permission from the public cannot say that their permitted occupancy of the street is superior to the permitted occupancy of the street by the telephone company. We are confident that courts will not ultimately so hold. In determining the mutual rights and duties of utilities in the highway, we may safely start with the premise that the rights of utilities permitted to use the highway, having as the common basis public need and the public's permission, are inherently equal, each to each.

These considerations make clear the mutual rights and duties of utilities in the highways:

Each utility using the highway must use it in such a manner as not to unnecessarily interfere with the proper use of the highways by another utility.

This rule involves no novel principle. It has been announced as applicable to persons using the highways ever since legislative bodies have passed or courts have announced rules for the use of highways. In every case involving an injury on the public highway, it is under this principle that the injured party either succeeds or fails to recover resulting damages. Pedestrians, automobiles and street cars all have equally the right to use the street, and each is bound in using the street to exercise reasonable care, not to interfere with the rightful use by others or to cause self injury or injury to others. A failure to exercise such care, causing injury, subjects the negligent street user to damages measuring such injury.

Police Powers and Unfair Competition

We are confident that this principle or rule, if correctly understood and fairly applied, will solve most of the present disputes over the common use of highways by utilities. Necessarily the rule does not state or define the particular practices which fall within or without the rights of a utility on the highway. The extent of the regulatory power of the state, rather inaptly called the police power, admits of no defined boundaries. The state may regulate or prohibit for the general welfare. What particular practices may be prohibited can only be determined when an actual situation is presented. So, unfair competition is its own definition, and whether a specified practice falls within or without the field of fair trading depends upon the circumstances and the actual results of the practice. Yet both the extent of the police power and methods of unfair competition are generally understood, and except in border cases, each affords a sufficiently definite guide for business activites.

The chief difficulty in applying this rule to an actual situation lies not in the general terms of its statement, but rather in the executive officers' conception of the utility's rights in the highway and their resulting attitude. There is undoubtedly a tendency on the part of executives to consider that their utility has proprietary rights in and to the highway. They regard interference by another utility with their use of the highway as an invasion of their proprietary rights. Rights in the highway are considered substantially the same by them as rights in privately owned power plants or rights of way. Even commissions and courts have frequently, in decisions upon highway uses and interferences, apparently considered that the interests of the utility as an entity were of chief importance, rather than the interests of the public receiving service. Such view is subversive of the true principle. If one utility unnecessarily interferes with another in the highway, it thereby interferes with the public served by that utility. If the utility does not so adapt its use of the highway as to permit a reasonable use by another, it thereby bars, to some extent, the public from the use of that highway. Stated in another way, the use by every utility of the highway is a use by it as a representative of the public. A utility cannot at once affirm and deny the public right, affirm it as to its own representative public right and deny it as to another utility's representative public right.

Better Methods Encouraged by This Rule

The rule that each utility using a highway must use it with reference to the reasonable use by other utilities necessarily excludes any method of using a street that is inconsistent with other reasonable existing methods of use of that street. It almost, in terms, prohibits the maintenance in the street of an obsolete or defective system which cannot exist alongside of or which injures a permitted modern, properly maintained system. There is no difference in principle between defects due to lack of maintenance and those due to obsolete type which either cause injury to another or result in self-injury. In either case the failure in duty and the responsibility for resulting loss rests on the company using the street in a manner inconsistent with the proper use of the street by others. Manifestly a utility using a highway has no grounds of complaint because of the fact that its own improper use of the highway results in its own injury. It has grounds of complaint if it is injured by the improper use of the street by another utility. Each utility, therefore, should exercise care, skill and expert knowledge to make the manner of its occupancy of the highway in respect to construction, maintenance and proper co-ordination consistent with the use of the street by other permitted systems. Nothing short of this is the performance of its duty to other utilities or to the public.

Because of the differing characteristics of communication and power lines—the former operating with low energy and sensitive apparatus and being very susceptible to interference, the latter operating with high voltages and abundant energy and inherently creating about itself a field of inductive influence—interferences in the highway and difficult problems more frequently occur between power and communication lines than between two power lines or between two telephone lines, although the records of court cases show that rival signal companies and rival power companies have occasionally indulged in protracted and bitter controversies over mutual rights on public streets. The fact that in case of interferences between power and communication systems the resulting injury falls almost wholly on the communication line, does not in any degree lessen the duty of the power company to do its part to prevent the injury. Neither does it absolve the communication system from its duty to do its part to prevent the injury. The signal line can not capitalize its weakness any more than the electrical supply

line can take advantage of its strength. Each must do its part towards the full performance of the mutual duties. Each must occupy the highway with a line, as to type and maintenance, suitable to the joint occupancy, and each must co-operate in approved practices to avoid unnecessary interference.

But it may be said that while this rule, resting on equality of right and equality of duty, may be applicable when utilities enter the highway at the same time, it is not applicable in cases where one utility establishes itself in the highway before the other. This claim is continually made and, if valid, has far-reaching results.

Another Moot Question Is Discussed

Does priority of occupancy establish superiority of right? The claim of a superior right in the highway through occupancy, involves the conception that the occupancy of the highway is an appropriation by the utility of the highway to some extent. Manifestly against the public right there can be no such appropriation. The appropriated part would cease to be a part of the highway. This is what occurs in occupying mining claims, homesteads and similar properties. Through occupation and certain formalities the public ownership ceases and a private ownership is established. But this cannot take place as to a highway. It remains public, to its entire extent and for all purposes, after occupancy, the same as before occupancy. Not only is there no acquisition of title to part of the highway by occupancy, but a utility acquires no perpetual right to maintain its poles in a certain position or its wires at a certain height or to continue a certain type of construction. The permitted use is from day to day. This does not mean that the public, having granted the use, may arbitrarily exclude a utility from the highway and thus destroy its property right, but it means that the public has a continuing control of everything affecting the general use of the street. It may exclude a type of line today that it permitted yesterday, and it may do this either by direct regulation or by permitting the use of the highway by another utility. Any method or practice adopted by a utility first occupying the road that unnecessarily interferes with a permitted occupancy of that road by another utility conflicts at the time of the interference with the public control of the street. The interference, rightly viewed, is between the first utility and the public, and not between the two utilities.

Where, by a general grant of permission, different utilities are permitted in the highways, the idea or claim of an exclusive right of use by one utility is expressly negatived by the general permission. Even where the grant to one utility, as well as the occupancy, precedes the grant of permission to the other utility, the result is the same. The original grant of use does not usually purport to be the grant of an exclusive use. Even if it did, the exclusive feature would be invalid. The state holds the public easement in highways in trust for the public. It cannot barter it away or limit the public right. Whether expressed or not, the power is necessarily reserved in the state to permit all public uses of the highway not inconsistent with the general use or with the rights of abutting owners. Under this reserved power, the subsequent grant of permission to use a highway stands on a par with the prior grant.

All Should Apply the Golden Rule

Physical properties constructed by one utility in the street cannot be removed or injured by a second utility, but even this does not indicate a superior right in the highway. It shows rather certain advantageous incidents of prior occupancy arising from the fact that two bodies cannot, at one time, occupy the same space. Men have equal rights on the sidewalk. Under that equality, one man cannot push another off the sidewalk and occupy his place. But, even so, one man may not stand on the sidewalk in such a way as to unnecessarily prevent others from traveling on the walk. So the prior utility cannot, even as to its physical property, unreasonably interfere with others, cannot maintain poles and wires so located as to prevent the location of other poles and wires on the street. The right of the prior company to noninterference with its physical property is a legal absolute right easily determined and capable of exact enforcement. A number of related rights and duties, such as placing or joint use of poles and transposition of wires, involve agreement and mutual adjustments. There is no exact legal duty involved. The obligation is in the nature of a moral obligation to live in harmony on the street and to give the public the largest possible service.

This Will Interest Telephone Companies

It will be said that these general principles governing highway occupancy do not give due consideration to the public receiving service from the utility first in the street, for example, patrons of rural grounded telephone lines. Such lines have been the sole utility occupant of many highways for years. They cost less than metallic circuits, are more easily maintained in a fairly usable condition, and give a satisfactory service at a low cost. This low cost has made possible or at least has induced a very general use. So long as such a line has the highway to itself its troubles, if any, are internal, and cheerfully borne, but if a power line parallels it, immediately the telephone absorbs troubles from the outside, which are neither easily nor cheerfully borne. The situation is charged with troubles. The single-wire line does not admit of transposition. Even though both lines are in good repair and on opposite sides of the highway, they together create a common electric field. The two lines are inductively coupled with each other. The susceptible line suffers in function, and the resulting telephone service may be destructively impaired. This result is so usual that it may be said to be inherent in long parallels of fairly high-voltage power and single-wire telephone lines.

What is the remedy? Clearly not to exclude the power line from nor to hamper its occupancy of the highway. That would deny progress. It would contravene the public policy expressed by the permission given the power line to occupy the street. While telephone companies, because of the relatively cheap construction and low power requirements, have extended their service more rapidly than the power companies, using power plants of large capacity, and expensive transmission and service lines, this affords no measure of the relative value to the public or the present or future demand for power and telephone service. Power is the essential requisite to modern development. It is most readily transmitted and supplied where needed in electric current. In recognition of this cast the public has opened the highways to electric power lines and power companies are rapidly extending their service throughout the country. Very soon an arterial highway unoccupied by power line will be exceptional.

Growing Public Needs Must Be Met

Of course the recognized remedy for inductive interference such as above referred to is to make metallic the telephone circuit and coordinately transpose the lines. This is the general telephone line construction in urban streets, in toll lines and wherever signal lines are placed in streets occupied by power lines. It is the standard construction for jointly occupied highways. It is the type of line adapted to such joint use—to the existing condition. But the two-wire line is more expensive than the single-wire line, the increased cost becomes a burden on a rural telephone line and its users; and if we assume the increased efficiency of the line is of no value to the users, it is an uncompensated burden. Even so, it is difficult to see how the

prior sole occupancy of the highway by the telephone company affects the present joint occupancy and the mutual rights and duties of the utilities. The prior occupancy simply permitted the telephone company to use the less expensive construction for a time. The change and resulting injury are not due to any failure of duty of the power utility, but to the growing public need and varied use of the highway to satisfy that need. For an injury so caused there is no redress. A similar question arises as to single-wire ground-return service power lines supplying users along highways. Conductive interference with a grounded telephone line in the same highway will result. But if the telephone line is metallicized this conductive interference becomes unimportant. Whether there is inherently from such a supply wire inductive interference is a matter on which experts will differ. But a supply company cannot as a rule before a court sustain the position, that the signal company should metallicize its line to avoid interference, and the power company should be allowed to continue a grounded service line. The supply company must do its full part to harmonize the methods of joint use of the highway. It must bear the uncompensated burden of putting its own line in highest modern standard condition. It must do this to avoid the charge that it is attempting to monopolize the highway through comparative immunity from extraneous interferences.

There are two kinds of injuries which utilities, as well as individuals, suffer. One arises from the violation of some duty. Such injuries may usually be prevented by injunction and must be compensated for by damages in a proper action. Another class of injuries arises without any wrongful act, but through a change in furtherance of the public welfare. For such injuries there is no redress. They cannot be prevented by injunction. For them no damages may be recovered. The existence for centuries of the legal phrase damnum abscue injuria, which describes such injuries—injuries without recoverable damages—indicates that they always have been and always will be encountered. Progress cannot be stopped by private interests, and no damages can be recovered because of interference incident to such progress.

Moral as Well as Legal Duties

Mutual rights and duties in the highway may be divided into two classes or groups. As to certain practices and situations, the rights and duties are absolute, based on well defined, clearly established legal considerations. As to other practices and situations, the rights and duties are not fixed. They depend upon mutual agreement and voluntary adjustment. They rest solely on considerations of helpful co-operation and the avoidance of controversies. In each of these classes the same rule is applicable, but on entirely different principles. The one rests on legal right, the other on moral right. An important duty in the first class is the obligation of every utility to maintain a modern system in proper repair, a system suitable for a jointly used highway. This is an absolute duty. It applies alike to supply and signal lines. A utility is legally responsible for failure to perform this duty. If such failure injures another utility, the offending party may be enjoined from such use of the street or be compelled to pay compensating damages. If such failure destroys the usefulness of the offending utility, it has no redress except to change its method of use of the street, and the burden of this change it must itself bear. The second class embraces the duty to co-operate in such matters as the location of lines in the highway, co-ordinating transpositions and joint use of poles. This is a moral duty. For a failure to perform there is no legal liability. For such failure the utility suffers principally through resulting controversies and retaliatory interferences. If adjustments are not voluntarily made by the utilities so as to give the public the fullest service with the least interference with other uses of the highway, legislation or commission rules will compel co-operative practices. Even on private rights of way railroad companies are thus compelled to permit track crossings and use of terminal facilities by other railroads. Street car companies are frequently compelled to permit the movement into the city of suburban cars over their lines.

The appointment of a joint general committee to consider and report on co-operative measures for supply and signal utilities, which will further co-ordinate and prevent unnecessary interferences in highways, shows that this association and the participating signal utilities appreciate that they have mutual duties as well as rights in the highways, and that a common understanding and declaration of those rights and duties and proper practices thereunder, are essential to a free and harmonious use of the highway.

Certainly, the utilities are more able, with their expert knowledge, to devise a just code of practices in highways than is any public body. It should be continually borne in mind in framing such a code of practices that the highway is public.

Kind Words for Utility Workers from Buckeye "Rounder"

Franklin, O.—Enlightened sympathy for public utilities was expressed by a feature writer, the "Rounder," for the Franklin Chronicle. Apropos of a recent storm in Franklin, the "Rounder" says:

"The public utilities, the Traction Company, the Telephone Company, and the Electric Light Company, were hard hit by the wind storm last Sunday morning. I have no estimate of the damage done but it must have been considerable.

"Day and night since the storm the linemen have been hard at work, seeking to repair the damage, replacing poles, stringing wires and repairing breaks.

"These are the things that the public never consider in their eternal growling at the public utilities. If you want a traction car and it is a few minutes late you kick. If the telephone girl keeps you waiting half-a-minute you storm and cuss. If the electric lights go out when you are reading the evening paper you howl.

"But in all kinds of weather, in time of storm and flood, these faithful servants of the public are on the job to give you the best possible service at the least possible expense, and few of the men who work for and with these utilities ever get rich.

"The wind in a few moments may wipe out the entire earnings for months."

Rangoon, India—A direct telephone line from Pegu to Rangoon has recently been put into operation. The extension of the line to Mandalay proposed.

Reval, Russia—Long-distance telephone communication has recently been established between Leningrad (Petrograd) and Reval.

New England Plant Costs Nearly Double Pre-War

Boston, Mass.—Vice-President Chas. S. Pierce of the New England Telephone and Telegraph Company, says: "It now costs from $250 to $275 for new plant for each new station as compared with pre-war cost of $140 to $150 for each new station. Consequently the gain of the company in units of plant, which is the real measure of its ability to increase its telephones, and in consequence its revenue, has not been proportionate to the increase in dollar investment."

New York, N. Y.—During 1923 the New York Telephone Company made a net gain of 203,230 telephones.

LINE AND DESK

FURTHER COMMENT ON SECTIONALIZING CABLE SHEATH

In further comment on the suggestion of F. B. Woods in our May "Line and Desk," we have a letter from W. S. Low of Sherbrooke, Quebec, who says:

"Regarding F. B. Woods' query about opening messenger at intervals for the purpose of testing for location of ground by water in cables. By opening messenger only, I do not see how ground is cleared in any section of the cable as per illustration. The ground would still bridge past opening in messenger through sheath of cable and Locke rings.

"I am interested in what others may have to say."

Mr. Low apparently has overlooked the presence of the insulating joint which separates the cable sheath into sections, also. The presence of these insulating joints is one of the objections to the plan, as they are expensive to install and maintain. There are, also, times when it is necessary to have a continuous cable sheath.

MAINTENANCE MAN'S REMARKS ON SWITCHBOARD DESIGN

Have you telephone switchboard maintenance men ever stopped to wonder what the telephone engineers were thinking about when they designed various switchboard equipment upon which you have to "shoot trouble" and, not infrequently, have to make changes and additions? I have, and I think with good reasons. If these engineers had to do the maintenance work around an exchange for a while—especially when some of the cases which I shall mention arise—or if they could watch the switchboard man doing his contortions and performing various acrobatic feats while trying to accomplish the almost impossible, I believe they would make a concerted effort to simplify switchboard design.

There comes to my mind right now a terminal block mounted on the back of a well known make of switchboard. This block is mounted horizontally on a panel at the back of the board and in such a position as to be almost inaccessible on the lower side where the cable from the I. D. F. terminates. Imagine a man assuming a position, such as he would have to, in an effort to work on the cable side of that block, for the purpose of opening a pair to locate a case of trouble. What is needed in this case is the periscope of a German submarine, a pair of pliers with a reversed-curve nose like a letter "S"—and a sweet disposition.

Then there comes to my mind, also, the disconnect lamps on the B. Board of a well known and much advertised board of today. These lamps are located on the cord shelf of the position, and not on the key board, as in most cases. Each lamp is placed directly in front of each cord socket, there being the customary two rows of each, with two bus bars running parallel connecting all these lamps. As the cords are continually touching these bus bars, in their upward and downward movements, it sometimes happens that the bus bar becomes disconnected from one of the lamp terminals. Here again is where the switchboard man vies with a Japanese contortionist in superhuman efforts to get that bus bar soldered onto that lamp terminal again. But after many efforts (and all the while humming some sweet (?) tune), he finally succeeds with much applause from the gallery.

I never could see, for the life of me, why companies producing telephone apparatus persist in soldering lugs on their ground and battery leads throughout the entire exchange, because these lugs have such a provoking habit of "going open" at the soldered joints. Why not cut these lead wires just a little longer and then turn a nice, neat eye on each end? Thus, each section of these leads, being composed entirely of one piece of material and being tightly fastened at the terminals, would allow comparatively no chance for an "open."

Did you ever trace a case of trouble down to the relay in a circuit, and have to remove the cap from that relay; or, maybe before you find it you may have to remove several caps? Now, what do you usually think (and often say) when you have to unwind a lot of those thumbnut cap fasteners, before you can remove the caps—and maybe, after having done all this, the trouble has cleared up? As for myself, I am not saying. But it sure is much more sensible to have a cap which can, more easily, be removed.

These are only a few suggestions, prompted by my observations while working around an exchange. I really believe that if the designing engineers could see these things as we switchboard men see them, they would try very hard to overcome such objectionable features.—Contributed by J. F. Koepsel.

HAZARDS OF CABLE WORK

In case of accident, a cable splicer in a manhole has only one means of escape, namely, through the opening in the roof, so it is absolutely necessary that this opening be kept clear at all times. It is most important, too, that a new employee be told beforehand of the dangers surrounding his work. I know of no branch of telephone work where it is of greater importance that a new employee be alive to the responsibilities attending his work than in the guarding of an open manhole.

Open manholes always should be guarded with suitable guards and with danger signals to protect both the public and the employees. The writer knows personally of an instance where a blind man walked into an open manhole which was unguarded.

The proper place to heat paraffin and solder is at a reasonable and safe distance from an open manhole—on the lower side if on a grade, so that in case the paraffin or solder should be upset accidentally, the chances of a fire being started in the manhole will be minimized. I speak from personal experience when I tell you it is no enviable position to be in a manhole when a stream of liquid fire comes pouring over you and ignites the paper clippings resulting from the work of two cable splicers for a whole day. Such an accident was caused by a guardman tripping over a handline and spilling a pail full of hot paraffin, which ignited by the upset furnace came rushing into the manhole and filled the manhole with a flame which reached the trolley wire for the street cars.

When passing hot paraffin or solder to a splicer in the manhole, the splicer is absolutely at the mercy of the guardman and this danger of fire stands out in my mind as the greatest hazard in

cable work. Therefore, the proper instruction of a new employee is most important, and probably the solution of another problem in accident prevention. —Arthur Hindle in "Telephone Topics."

A HINT FOR SPLICING COPPER-STEEL WIRE

For splicing No. 17 copper-steel, paired, drop wire I use the No. 17 copper sleeves and cut them into four lengths, which effects a saving in the sleeves, time and tape required to make a joint. After twisting one and one-half turns, cut off and bend the loose end back, press into groove and you have a good mechanical and electrical joint. I have never yet had one fail.—O. C. Rutledge, wire chief, Mt. Sterling (Ill.) Telephone Co.

THE TRANSMITTERS DID NOT "PACK"

Back in the early days of our exchange, we built our own transmitters. I have never seen anything just like them. We purchased the back carbon electrode and used a ring of felt to retain the carbon granules. The machine screw that passed through the back electrode had a ratchet wheel mounted on it. The transmitter was mounted on the box in such a way that a pawl attached to the hook switch operated the ratchet. Each time the hook was lifted the transmitter was given a small turn by the action of the ratchet wheel. This was done to prevent packing. All of these transmitters have been out of use for many years. We did not even save a sample of what would now be quite a curiosity.—Contributed by Fred Preston.

THE REPAIRMAN CAN HELP PUBLIC RELATIONS

Let us look at our business for a minute and find out what we are after.

We are after the furnishing of a good, reasonable, efficient service to the public at a fair return. You all, no doubt, know that and you all, no doubt, feel that the public should know it, but the hard part of it is that the public doesn't know it.

Our job is to let the public know what our company is trying to do. This is not to be done with a brass band and a torch light parade, but by our everyday contact with the public and particularly our subscribers.

Each repairman is the best public relations man we have. Why? Because he comes in direct contact with more people outside the telephone organization than any other man in the Plant Department. Now, if he knows the policies of the company; if he knows what the company is striving to accomplish; if he knows his job and clears his case of trouble and not only clears it but takes care of any other potential cases of trouble while on the subscriber's premises; if he is neat in his personal appearance; if he is careful of the property of the subscriber and sees that it is in no way injured or destroyed; if he has faith in his company and knows it is fair and reasonable, then he is in a position to take care of any arguments he may meet, and he meets none, he is going to leave the subscriber's premises with the subscriber feeling that the telephone company certainly has men in its employ who know their business and are considerate of other people.—F. A. Montrose in "Bell Telephone News."

A REPORT CARD FOR DANGEROUS CONDITIONS

The Rochester Telephone Corporation, of Rochester, N. Y., has adopted a postal card form for use of its employes in reporting dangerous conditions. The cards bear the address of the Plant Superintendent. On the reverse side space is provided for a report of the situation, as shown in the accompanying reproduction:

USE THIS CARD TO REPORT
Dangerous Condition
WHERE IS IT?
WHAT IS IT?
DATE ..... SIGNED .....
Mail this card or give it to your supervisor

Arrangements have been made in the office of the Plant Superintendent to keep a record of these reports, follow up their disposition and report back to the employe who made the original report.

AN ARGUMENT FOR A DEPRECIATION RESERVE

This photograph, reproduced by courtesy of "The Transmitter," is an eloquent argument for an adequate depreciation reserve. It is only one of several piles of copper wire salvaged in and around Frederick, Md., after the storms of last February and March.

AN UNUSUAL CABLE ACCIDENT

An unusual accident to a telephone cable is described by E. B. L. Taylor in a recent number of "The Transmitter." At Roanoke, Va., a 909-pair cable was attached to a bridge under which a railroad belt line passes. A flat car, loaded with a concrete mixer, was being switched along the railroad and, in some way, a part of the mixer caught on the cable. The concrete mixer was dragged from the car and smashed beyond recognition. The telephone cable was pulled in two and was pulled out of place in three manholes on one side of the break and in two manholes on the other side. On the office side of the break, a 400-pair branch cable serving over 600 stations was put out of service and it was necessary to saw off the main cable to restore these stations to service. There were 465 lines serving 882 stations beyond the break. Twenty-three hours after the accident work of restoring service began, and twelve hours later the work was completed and all service was restored.

Bell Plant Additions in 1924 to Be Approximately $270,000,000

New York, N. Y.—The estimated expenditures of Bell additions to plant in 1924 are outlined in an official statement from the company which says:

"Owing to continued demand for telephone service the construction budget of the Bell system, i. e.—American Telephone & Telegraph Co. and the associated companies, as planned for the year 1924, will show a substantial increase over 1923. For the year just closed the net additions to plant amounted to something over $240,000,000.

Proper Pole Fitting Practice

Construction and Use of Line Material Used for Protection of Poles and Carrying Wires, Is Outlined—Some Construction Pointers Worth Heeding—Tests and Data on Fittings

By P. Kerr Higgins

The various parts that are used in conjunction with poles either for protection of the pole or for support of wires are known collectively as pole fittings. A description of some of the more important pole fittings together with some suggestions for their use are given in the following paragraphs:

CROSSARMS—Cross arms are placed to better advantage before the pole is set, especially if the required number of arms is known. They should be fastened to the pole by cross arm bolts long enough to go through the cross arm and the pole without cutting the back of the pole. They should be supported by two braces from twenty to thirty inches long which serve to stiffen the arm and prevent it from warping. The cross arm should be placed at right angles to the length of the pole and not parallel to the ground even if the pole is raked. At curves or corners where the pull is more than twelve feet, cross arms should be back braced to give additional strength. In lieu of this practice double crossarming may be resorted to and is preferred by many. At railway crossings double arms should always be used. When a pole lead makes a double corner or changes from one side of the road to another, the last arm should be set at right angles to the line of direction leading to the corner, and the first arm leading away from the corner should set at right angles to the new line of direction of the lead.

At long spans, crossarms should be placed on the sides of the pole away from the span, thus allowing the weight of the long span of wires to draw the arm against the pole. On curves, the crossarms should be placed on the sides of the poles facing the middle of the curves. When a line is headguyed in one direction only, crossarms should face toward the guy. When lines cross from one side of the road to the other, crossarms are placed on the sides of the poles facing the terminals. Crossarms should always be attached to the pole in such a manner that the pull of the wires comes on the pole instead of on the crossarm bolt. To do this the crossarms on adjacent poles face in opposite direction. This is done to reduce the number of arms liable to be pulled off should a pole break.

GAINING—Cutting a space or notch in a pole into which the crossarm fits is called "gaining." The top and bottom of the gain is marked on the pole at the desired location of the crossarm. The pole is then sawed at these two points to the depth of ½ inch and the wood in the space between the sawcuts cleared by a wood chisel and made reasonably smooth. A 21/32 inch hole is then bored through the pole at the center of the gain. Poles that are to carry crossarms should be gained and bored for the full capacity of the line even though this may not

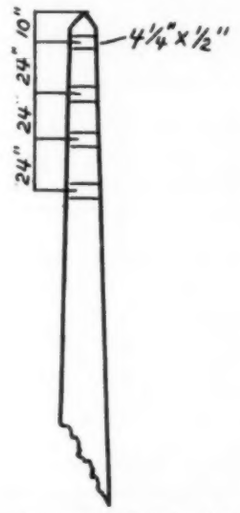


Fig. 1—Customary Spacing for Gains

be necessary at the time. Fig. 1 shows the customary spacing for gains. The gains should be so cut that the crossarms will fit snugly to the pole. Crooked poles should be so gained that when set the crooks will show least when viewed in the direction of the line. On curved poles gains should be cut on the concave side, that is the side which bows inward.

HUB GUARDS—Where poles are liable to be injured by the hubs of passing vehicles the butts should be protected with iron hug guards placed on the side of the pole liable to be damaged. If a ground wire is on the pole where a hub guard is used, it should be placed under the hub guard.

LIGHTNING RODS—Where necessary lightning wires should be placed on the poles before setting. The object of the lightning wires carry lightning discharges to ground and thus prevent damage to the poles. They are usually placed on every tenth pole. If this protection is not provided, poles are likely to be shattered. Lightning wires are not considered necessary on city work and should be avoided where the poles are near high tension lines. If protection is installed after the pole is set, it is economical to use a ground rod instead of a small coil of wire at the base of the pole.

PAINTING—The exposed portions of the pole favorable to the lodgment or growth of fungous spores should be given a coat of carbolineum or other preservative which acts as a poison in the food upon which the fungi exist. Some of the exposed portions are the roofs, gains, bolt holes and other portions of the pole covered with guy plates or guards. In applying this preservative, great care should be taken to fill all season checks or cracks particularly of the roof of the pole; otherwise decay is likely to commence in these checks or cracks. Preservative should not be applied when the pole is wet or when very cold for the reason that it cannot properly be absorbed. All other painting called for by city ordinances or considered necessary by the company should be done after the poles are set. In this case it is best to shave the poles before applying the paint and the same rule applies that the pole should only be painted when very dry.

ROOFING—Cutting the top of the pole into a wedge shape with a right angle between the two sides is called roofing. The object of roofing is to shed water. To secure uniformity the apex of the roof of poles should always be in line with the lead. The apex of stubs should be in line with the guy and buckarm or junction poles in line with the main lead.

SHAVING—The shaving of poles is not considered necessary except when they are to be painted or when they are very rough in appearance and would be objectionable. All knots should be trimmed close.

STEPPING—The object of stepping

poles is to reduce the damage done to poles through constant climbing; hence all poles should be stepped where testing or examination is frequent. To the average layman it would appear as though linemen would take advantage of the stepping of poles and use them to good purpose, but in practice it is found that many linemen persist in using their spurs and thus defeat the object of the steps. This practice damages the pole by opening the wood for the admission of moisture and thus hastens the decay of the pole. Steps are generally placed in line with the lead to make them inconspicuous and also to avoid possible injury to passing vehicles. Iron steps are driven alternately on each side of pole 18 inches apart. Wooden steps are usually used for a distance of six feet from the ground.

PINS—These are usually made of locust. Other woods have been used but this has been found the most serviceable, although eucalyptus is coming into strong favor. Pins should be of the best quality and free from knots and soft wood. Two sizes are used, one for straight line work and one for transposition. The pins are held in place by 6d wire nails driven through the cross arm at the base of the pin. The painting of cross arms has many advocates and when used two coats of black metallic paint which is a mixture of carbon gas black, boiled linseed oil and B & T drier is recommended.

INSULATORS—These are usually of glass, but porcelain insulators are often used. Insulators are usually of two kinds, the regular line insulator having one or two grooves and the two-piece insulator used for transposition. Sometimes the double grooved line insulator is used for transposition, but while less costly than the special insulator it frequently causes trouble. The insulators should be free from cracks, points and other defects.

CARRIAGE BOLTS—Carriage bolts usually four and a quarter inches long by three eighths inch in diameter are used to fasten the braces to the arm.

WASHERS—These are of two kinds, round and square. The round washers are one and a half inches in diameter by one-eighth inch thick, with a half-inch hole in the center. Square washers are two and one quarter inches square, three-sixteenths inch thick with a three quarter inch hole in the center.

MACHINE BOLTS—For fastening the crossarm to the pole, machine bolts five-eighths inch in diameter and from eight to twenty inches long are used. Each bolt has the threads cut for four inches, with nut to fit. For 6-inch top poles, 10-inch bolts are used. For other sizes of pole corresponding bolt lengths are used.

POLE STEPS—Steel pole steps are ten inches long, by five-eighths inch in diameter.

STAPLES—Two-inch steel staples are ordinarily used.

NAILS—Nails used for pins are six-penny and for brackets and wooden steps 30 and 60 penny galvanized iron nails.

DRIVE SCREWS—Drive screws, sometimes called lag screws or lag bolts are used for fastening the cross arm braces to the pole. They vary in length according to the size of the diameter of the pole.

BACK BRACES—These are usually made of angle iron and used on corner and terminal poles. They should be placed on the opposite side of the pole to the crossarm and in the same horizontal plane. They are attached to the pole and the ends fastened to the crossarm as a reinforcement. Except in rare cases the writer prefers the double crossarm.

BUCK ARM—This is a crossarm placed at right angles to the regular crossarm on a pole at a corner or where a branch lead leaves the main line.

COACH SCREW—This is a gimlet-pointed screw with a square head similar to a lag bolt and is sometimes used to fasten crossarm braces to the poles.

DOUBLE CROSSARM—This is two similar crossarms mounted on the same pole and placed one on each side of the pole, parallel to each other, and bolted together.

DROP BRACKET—An iron bracket used for transposition purposes designed to support an insulator under the crossarm. The duplex bracket is designed to support two insulators and the Phantom transposition bracket, or four insulators.

CROSSARM BRACES—Usually made of wrought iron or low carbon steel galvanized, from twenty to thirty inches long, one-quarter of an inch thick and one and a quarter inches wide. They are attached to the cross arms by means of galvanized iron carriage bolts. The washer is placed next to the head of the bolt and the bolt is driven into the crossarm from the back, so as to allow the washer to rest in contact with the crossarm.

WOOD BRACKETS—Where wood brackets are used, they should be placed opposite each other and so arranged that the wires will be sixteen inches apart, the first bracket being placed seven and a half inches from the top of the pole. It is not considered good practice to place more than three brackets on a pole line as the wires get too low and the risk of trouble is great, and the appearance of the line bad.

GALVANIZING—All steel or iron fittings, as well as wire and strand, must be thoroughly galvanized and should be able to stand the following test:

"The sample shall be immersed in a saturated solution of copper sulphate for one minute and then wiped dry. This process shall be repeated three times. If after the fourth immersion there should be a copper deposit on the sample, or some of the galvanizing removed, the lot from which the sample is taken should be rejected."

Pole Setting and Hole Digging

After the pole line has been properly staked out, the holes are dug for the poles. Holes should be large enough to enable the pole to slip in easily without hewing or stabbing and must be full sized at the bottom so as to permit of tamping. The depth of the hole depends upon the length of the pole to be set. The following table gives the average depth in feet now in use:

Length of Pole, Feet	Depth in Ground, Feet	Depth in Rock, Feet
20	4	3
22	4½	3
25	5	3
30	5	3½
35	5½	3½
40	6	4
45	7	4½
50	7½	4½
55	7½	5
60	8	5
65	8½	6
70	9	6½

As a rule corner holes should be dug from ½ to 1 ft. deeper than for line poles. Guy stubs should be set not less than seven feet in solid ground.

If possible no hole should be located where it will be subject to a constant wash or where the earth about the base is being constantly carried away. When necessary to place a pole in such a location, it should be cribbed on the lower side so that the cribbing will catch the dirt washed from higher up. Great care should be taken to see that the hole is the proper size for the pole. Any attempt to enlarge the hole after the pole butt has started in and stuck, means a poor job and loss of time. As a general rule only one shovel with three tampers should be used, the dirt being put in little by little and tamped hard so that there is little or none to pick up after banking around the butt. There are cases in very soft soil, where even with good tamping it is hard to keep poles properly lined up. In cases like these, a key log should be placed just beneath the surface and at right angles to the strain on the side to-

wards which the pole leans under wind pressure or strain. The dimensions of the key log is governed by the height of pole and other requirements, the average being eight inches in diameter and from four to eight feet long. The use of key logs in guy staff is shown in Fig. 2. Where a pole is set in a sloping bank the depth of the hole must be measured from the lowest side of the opening and where the bank is soft and the pole liable to kick out, the pole should be set as much deeper as seems necessary. The bank around the pole should be at least six inches above the surface and firmly packed around the pole so as to shed water away from the pole. In filling holes all coarse soil, gravel or stone should be used at the top of the hole. In soft ground, the bottom of

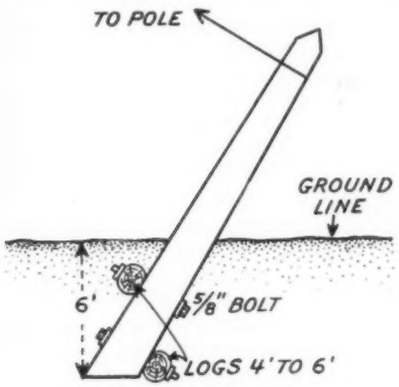


Fig. 2—Anchor Stub

the pole should be sawed square before setting in order to improve the bearing surface. Guy poles set in soft soil and subjected to heavy downward strain should be set on a foundation block of stone or wood.

In handling poles with a cant hook or bar, care should be taken to avoid damaging the poles at or near the ground line, as this is liable to produce decay or pocket rot. In distributing poles, they should be laid with the butt near location stakes and the top pointing upwards toward the grade if any. Crooked or curved poles subject to an equal strain should be set so that the strain will tend to straighten the pole. On curves and corners poles should be set as follows:

Amount of Pull	Span in ft.	Rake in in.
1 to 5 ft.	125	10
5 to 10 ft.	120	15
10 to 15 ft.	110	25
15 to 20 ft.	100	25
20 to 25 ft.	90	25
Over 25 ft.	75	25

Spacing of poles on straight runs varies with the load from 17 to 40 poles per mile.

Dynamite as an Aid in Hole Digging

Frequently when telephone lines are being constructed trouble is experienced in digging the holes for the poles, especially when the ground is very hard, dry or difficult to work, due to a large amount of very coarse gravel in clay subsoil or shale rock. The old method was to use the long-handled chipping spade and spoon shovel, but this was slow and expensive. Present practice resorts to the use of explosives. The use of dynamite has greatly reduced the cost of rock digging and simplified the labor in connection with it. There are several methods of using dynamite for this purpose. One is to roll up a paper tube and fasten small pushing pins into it from the outside. Then the tube is lowered into an auger hole to the depth desired and the dynamite exploded by a cap and fuse at the upper end. The resulting explosion loosens the earth for a small space and makes it easy to dig. Small charges of dynamite will thus drop into the bottom of the hole and loosen up the obstructions so that they can be removed. This method is not entirely satisfactory, and so the most efficient methods are those which utilize the power of the explosive to throw the obstructions and earth completely out of the hole.

One of the objections, however, to this method is that it tears a crater several feet across the top of the hole and necessitates additional work and a poor job at that unless the operator properly places and gauges the charge. In order to make this method efficient it is necessary to give the force of the charge a guide to direct its work. This is done by digging a hole about the depth of one cut of a long-handled tiling spade and to the exact size of the hole wanted. The bottom of the hole is leveled off smooth and the sides left perfectly straight. A hole is then bored with a long one and a half inch auger until the proper depth is reached and the charge placed in the customary manner. The earth should be disturbed as little as possible. The charge may vary from half a stick of Red Cross dynamite extra 40% to four one-quarter sticks 40%. By increasing the percentage of the charge, not to exceed 60%, and using the same quantity, the writer has obtained better results. However, good judgment and experience as a general rule are the only deciding factors in the use of dynamite. The following experiments made by Van Deventer & Warren for the Du Pont de Nemours Powder Company may be of value to those finding it necessary to work with dynamite:

1. Half stick of Red Cross extra 40% in bottom of hole untamped. Results: poor. Large cavity blown in bottom of hole about 30 in. in diameter; earth for two and a half feet below surface undisturbed.

2. One-third stick Du Pont straight 60% at bottom, one-third Du Pont straight 60% 8 in. from bottom, half stick Red Cross 40% twenty inches below surface. Cap in top stick untamped. Results: Good, hole clean and open.

3. One-third stick Du Pont straight 60% at bottom, same 12 in. up; same 12 in. up, cap in top of stick untamped. Result: Same as No. 2 except more earth thrown out of hole.

4. Five quarter sticks Du Pont straight 60% evenly distributed about six inches apart beginning at bottom of pole, untamped, cap at top. Results good, hole uniform in size and dirt well thrown out.

5. One and a quarter sticks Du Pont straight 40% in small pieces placed in paper tube. Pieces about four inches apart beginning at bottom to within fourteen inches of surface of hole. Results: Excellent, hole clear of dirt.

It is evident from these that the holes having the dynamite distributed along the bore gave the best results, while those placed at the bottom do not open the hole at the surface. If too heavy a charge is used the earth is disturbed too much, especially at the bottom of the hole.

In place of using an auger a four-foot punch bar can be driven, especially in clay. If knocked transversely or sidewise while driving, its removal will be made easier. A better device is a hollow crown drill with cross bar having a cutting head to remove one and three-quarter inches and cross-

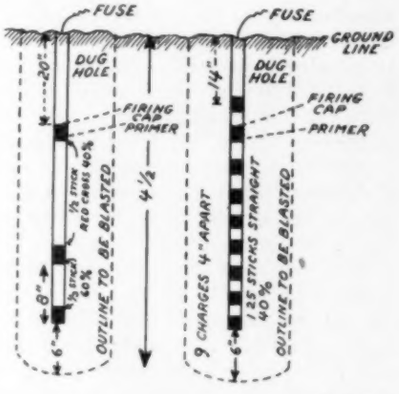


Fig. 3—Arrangement of Dynamite Charge

bar to bore two and three-quarter inches, which enables a man to bore a hole four and a half feet deep in hard clay or clay and water in about five minutes.

Using small charges of dynamite to loosen the soil and make digging easier is now a very common practice. It not only saves time and expense but

reduces the number of men required for pole hole digging. It has another advantage, namely, that the force of the explosion packs the dirt solidly around the sides of the pole and eliminates the tendency in hand digging to make the hole shallow. The sides and bottom of the guide hole are trimmed straight and clean. As the dynamite charges must be placed at various distances in the bore hole, it is customary to fasten or tie them to a piece of lath or other light stick, as shown in Fig. 3. The spacing between the charges is usually determined by the hardness of the soil and the diameter and depth of the hole desired. Pins are pushed through the paper tube to hold charges in place. The top cartridge or piece of cartridge is usually primed with a No. 6 blasting cap and fuse or an electric blasting cap. As a rule the primer charge is located about twenty inches below the surface and fuse allowed to protrude 2 or 3 in. from top of hole. The lath or stick carrying the charges in a paper tube is then lowered into the bore hole with the primer charge at top. In doing this great care should be exercised to see that no hard sod or stones fall into the hole as they are liable to interfere with the proper loading and firing. Where water is present in the hole, no tamping is necessary. Otherwise, a few inches of tamping improves the results. Tamping should not be allowed to go below the priming charge as it will interfere with the explosion of the lower charges. It is well to note that while water does not interfere with the exploding of the lower charges, loose dirt and rock do. When all set, the primer is then fired and the other charges in the hole are detonated by the force of the explosion. Extreme care must be taken to see that all persons connected with the operation and others are at a safe distance before firing the charge.

Another method which has been suggested, but not tried by the writer, is as follows: Dig hole as previously indicated, then drill hole to required depth. Use about one and a half sticks of dynamite, 50% in sand work, 60% in rock. Crumble all the charge in bottom of drilled hole except one-fourth of a stick in which is placed the cap and fuse. Tamp well into the drilled hole and fill the dug or top part of the hole full of dirt and rock; then fire with fuse attached. While those who have used this method claim excellent results, this claim would not seem to be borne out by the Du Pont tests.

Some Thoughts on Anchors and Anchoring

If the foundation of any structure is bad, then the whole structure itself is bad. So it is with good construction work. Good construction work is not possible without a good foundation and in order to secure a good foundation, poles must be substantial, properly spaced, deeply set and thoroughly tamped. The pole line thus built must be well guyed and corners built so as to hold the strain of the lead and so far as possible be proof against wind pressure. The downward thrust of corner and anchor poles is very great and a gradual sinking takes place if a proper foundation is not provided. This sinking slacks up the whole pole line, makes it unsightly and develops trouble. Cases have been known where poles have sunk as much as two feet and were the cause of needless expense. If the thoroughness with which poles are selected and set is of the greatest importance, what may be said of the anchor work? It is the key to the solidity of the whole plant. The loss of an anchor may mean the wrecking of the entire lead. Therefore no small detail of this work should be overlooked by the builder.

If conditions of soil are unfavorable to the location of an anchor hole, then it is best to move to a more favorable location if possible. Once the location is decided upon, there should be dug

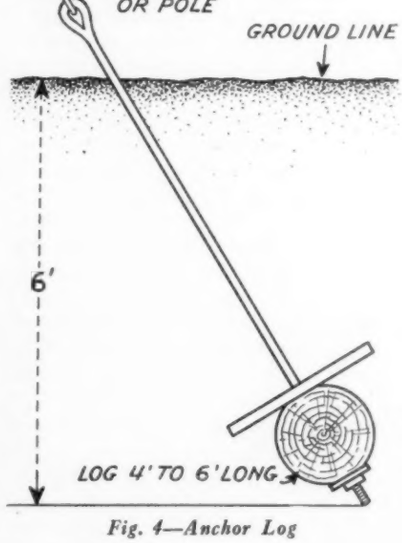


Fig. 4—Anchor Log

a hole of sufficient width and depth and length easily to accommodate the anchor or slug. If a slug is used it should be ample in surface to hold all future strains. The hole should be deep enough to carry the rod down to the eye. After being dropped in, the slug should be turned until the rod points directly to the spot on the pole where the anchor guy will terminate and this should be determined before the slug is set. If necessary the earth should be cut away under the rod until it lies at the required angle. The log may then be cross laid with heavy timber driven into the unbroken earth, as shown in Fig. 4. It is customary to fill in and tamp about one foot, then put on the first anchor guy, giving it a fair pull. This permits the rod being brought into direct line and held there while the balance of the tamping is carried on. Sighting is not sufficient as the rod is liable to be resting over a shoulder of earth which gradually gives way and slacks off until the rod pulls straight. This is one of the commonest and yet most easily avoided errors. When water is available, it is well to wet the ground occasionally as the tamping proceeds.

The anchor slug should be sound, of good red cedar (if it can be obtained), and ample in size and length. No timber should be used that has a decayed or hollow heart, as the shell is liable to collapse under the strain. If soft timber is used, a large bearing plate or 4 by 4 washer must be used. Anchor logs should be placed at right angles to the strain. If this is not possible, then an ample bearing block must be placed in front of the end to prevent slipping or ploughing under the load. In this as in other work, the objective is that things must be so placed that they will stay where they are put.

Anchor Hole Digging

In rock country it is frequently difficult to dig anchor holes due to rock formations. Two methods are in common use: first, blasting with dynamite, and, second, remove the soil down to the rock in the ordinary manner, then work out a medium size hole in the rock as deep as can be conveniently done, leaving the hole as rough and jagged as possible. The anchor rods for use in such locations are provided with bearing plates six by eight inches and are dropped into the hole and placed at the proper angle. The hole is then filled with a good concrete mixture well churned and left uncovered until the concrete sets, when it may be filled in and tamped in the ordinary manner. Rock keys are frequently used, but are not considered entirely satisfactory as they sometimes pull up with resulting damage to the pole line.

Another very good practice is as follows: With an ordinary wide bit drill drive a hole in the rock from 18 to 24 inches and slanting away from the strain. Take an ordinary anchor rod with a nut screwed on, but omitting the washer. Set the rod down into the hole and tamp lightly with pulverized rock, wetting the same as the hole is filled. Pull the eye of the rod into the proper angle and it will be found to serve its purpose excellently and save labor in blasting out for a standard anchor slug.

Gets Educational Publicity on Directory Methods

A Portsmouth (Ohio) paper recently published a story describing how the telephone directory is made and what precautions are taken to have every name correct. Incidentally, much good information was worked in about telephone service in general. We surmise that the article was inspired by our good friend and contributor, C. W. Kugelman, Superintendent of the Portsmouth Telephone Co. It contains so many valuable suggestions that we reproduce it in part:

"How many subscribers ever think of the vast amount of work involved in keeping up the records and getting out a new directory twice a year? An up-to-date list is kept of all subscribers. This is posted every day. Changes and additions are placed in the information operator's file as soon as made. When time comes for a new directory every name and number is carefully checked before being sent to the printer. As soon as he pulls a proof of part of the list it is checked and everything found not corresponding with the correct list is changed. Then it is returned to the printer for new proof, he then sends it back to the chief-operator for a final check. This checking and returning process is gone over until the whole list shows no changes or additions are to be made. The whole thing is then printed, bound, trimmed, punched and made ready for delivery.

The Whole Town Moves Every Three Years

Very few people realize how the population moves and changes. The whole town moves in something less than every three years.

"We are often asked, 'Why don't you get out a directory oftener?' Well, that may be a fair question, but we would have to answer: It wouldn't do much good; people simply will not stay put.'

So far this year we have made a gain of 890 stations, but in order to do that we have handled over 5,000 changes. These include installations, telephones moved and removed. Almost one-half of the directory listings have been changed in less than a year.

Telephones Move Oftener Than Other Utilities

No other business has anything like this to contend with. While the gas and water plants have many changes to make, they do not, as a rule, have to move their equipment. They simply lock the meters or turn off the water; while telephone companies in most cases have to remove their equipment or move it to some other part of the premises."

Japanese Speed Reconstruction

The Japanese have been doing marvelous work in erasing the marks of ruin left by the earthquake. Telephone construction especially has proceeded at a record-breaking gait. Simplex jacks, as shown in use in this illustration, are among the American-made equipment items that are helping the Japanese telephone workers in their reconstruction activities. Pole pulling is done with greatest speed and economy by the Simplex method which the Japanese have adopted and now are using generally.

Name New Bell Chiefs

Atlanta, Ga.—Ben S. Read returns to the land of his birth as the president of the Southern group of Bell companies. He succeeds J. Epps Brown, who resigned as president on account of ill health, and was made chairman of the board. Mr. Read is a native of Tennessee and formerly was an official of the Cumberland company. Prior to his election as president of the Southern companies he was for five years president of the Mountain States Telephone and Telegraph company.

Frederick H. Reid, succeeds Mr. Reed as president of the Mountain States. He is one of the youngest of the Bell company presidents. He began his telephone career in Denver in 1902, and rapidly advanced until he was elected general manager of the company in 1920. Two years later he was made operating vice-president of the Southern and Cumberland Bell companies.

J. Epps Brown

Ben. S. Read

Automatic Goes to Rescue

Installation of 2,000-Line Strowger Board in 30 Days Sets Record for Rapid Restoration of Service After Keystone Telephone Co.'s Manual Equipment Burns at Camden, N. J.

From the ashes of a manual switchboard at Camden, N. J., arises, in record time, a thoroughly modern Strowger automatic exchange. Less than forty days elapsed from receipt of the first shipment of material from Chicago to the cutting in service of the entire new system, June 30th.

Camden's switchboard before the fire

This incident marks one of the most remarkable achievements in the history of telephony—a new record for rapid restoration of service, after a fire which was so far reaching in its effects that the entire Camden manual exchange of the Keystone Telephone Co., comprising some 2,000 telephones, was thrown completely out of service.

A brief survey of the situation convinced Joseph F. Stockwell, Vice-President and General Manager of the company, that their only salvation lay in meeting the crisis promptly and vigorously. The task of clearing away the debris and getting ready for restoration of service was started at once and for hours workmen and officials alike labored, side by side, pulling wet, burned cable from the ruined switchboard.

Temporary equipment furnishing some degree of service to every one of the Keystone subscribers in Camden was supplied by the Keystone shop, which came to the rescue with a number of small P. B. X. switchboards, rigged up wtih temporary multiples and cables.

Fortunately, the building itself, although damaged to the extent of a charred floor and blackened and peeled walls and ceiling, was ready to receive whatever equipment was selected for the permanent installation.

Four years' experience with Strowger automatic equipment in the large Keystone plant in Philadelphia had taught Mr. Stockwell that automatic service was popular with business people, so he telephoned Automatic Electric Co. at Chicago, to find out just what could be done regarding emergency shipments and installation.

The Sales, Engineering and Manufacturing departments of Automatic Electric Co. made a hurried survey, and found that, by withdrawing certain units and switches then passing through the shop and changing them to conform to the requirements of the Camden exchange, shipment of the bulk of material could be made in less than a week. This news was immediately transmitted to Mr. Stockwell with assurances that anything that would tend to speed shipment and installation, or in other ways help in the rehabilitation work, would be done.

H. P. Mahoney, Superintendent of Installation and Operation, and Roy Owens of the Sales Department of Automatic Electric Co., also rushed from New York to the scene of the fire, where they rendered valuable assistance in temporary restoration of service and in the engineering and installation of the new switchboard.

The Directors of the Keystone Telephone Co. unanimously decided that this was not the time for any halfway or makeshift measures; that the crisis should be met vigorously and promptly; and that all reconstruction work should be of a permanent nature. F. C. Durant, Vice President of the Keystone Telephone Co., went to Chicago to make final arrangements and order the new equipment, while Mr. Stockwell remained in Philadelphia to supervise the many necessary local activities.

Twenty-four hours after the blaze

Through heroic efforts on the part

of the engineering and production forces of the Automatic Electric Co., material amply sufficient to begin and carry on installation work was shipped on the Saturday following the fire. This equipment, packed in a freight car and attached to a fast train as an express shipment, left Chicago at 8:30 P. M., Saturday, and was unloaded at Camden the following Monday.

From this on, the work was in the hands of the Installation Department. Early the week before, V. L. Bunkleman, one of the company's installation experts, had gone to Minneapolis, but he was quickly recalled and assigned to take charge at Camden. En route, he stopped in Chicago and consulted the engineers in charge of the design of the Camden installation. Other members of the Installation Department hurriedly were convened from various parts of the country, given instructions and dispatched to the scene. The Operating Department was represented by C. G. Slater, also of wide experience in automatic exchange equipment, and he arrived on the job the same day that the first carload of equipment was delivered in Camden.

The accomplishments of these men and their assistants in the following thirty days may be described as inspiring. While speed was essential, the work was not allowed to show evidence of haste. The finished switchboard was to be perfect, and the men labored with this continually in mind.

The men of Automatic Electric Co. and those of the Keystone organization co-operated to a degree that amazed even the most optimistic.

While the installation of the central office equipment was under way, the Keystone company began installation of the new telephones and mounting of dials on the numerous P. B. X. switchboards connected to the company's plant. Their supplies already on hand were reinforced by a shipment of 1,500 Type 21 automatic telephones from Automatic Electric Co.'s stock.

Arranging a few positions for temporary operation

By June 20th, the work in the central office was practically completed, and while the odds and ends were being cleared up, the final routine tests were put through all of the units and all of the miscellaneous services arranged for, including the installation of desks for handling inter-city calls between Camden and Philadelphia.

Putting finishing touches on automatic installation

The growth of Camden the past few years has been unusually rapid.

Appoint Permanent International Telephone Committee

Paris, France.—As a result of meetings of the International Consultative Committee on Long-distance Telephony, a Permanent Committee has been constituted which will consist, for the year, of 11 members representing the following countries: Great Britain, France, Germany, Austria, Belgium, Italy, Holland, Sweden, Switzerland, Czechoslovakia, and Yugoslavia.

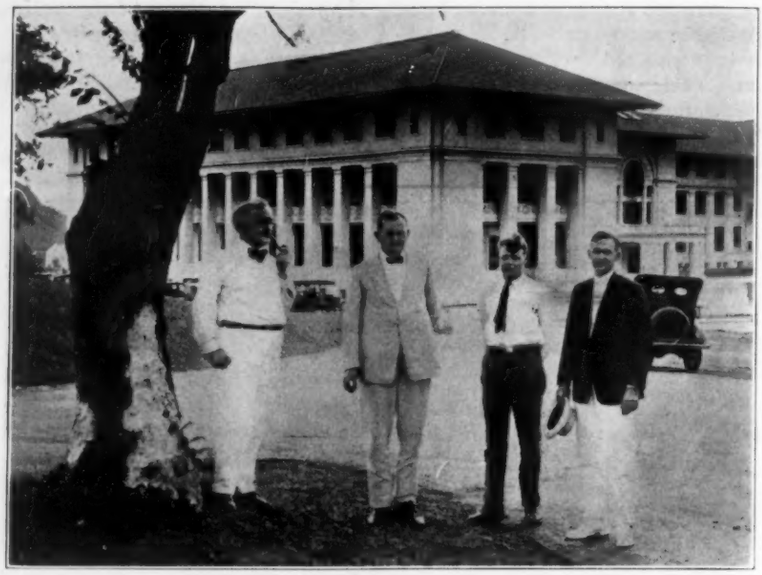
M. Milon, Directeur de l'Exploitation Téléphonique in France, will be the chairman. It was also decided to establish a permanent Secretariat, whose headquarters will be temporarily fixed at Paris.

Bell Pioneers Meet at Chicago, October 9-11

New York, N. Y.—The 1924 annual meeting of the Telephone Pioneers of America will be held at Chicago Friday and Saturday, October 10 and 11. The third meeting of the general assembly of the organization will be held at Chicago, October 9, at 8 p. m. Full details regarding special trains, hotel and railroad rates soon will be announced by Secretary R. H. Starrett.

Milwaukee, Wis.—F. M. McEniry, general commercial supt. of the Wisconsin Telephone company, was elected president of the Wisconsin chapter of the Telephone Pioneers of America at its annual meeting.

Zionsville, Ind.—Max Hosea has bought the controlling interest in the Citizens Telephone company here. Improvements are being made under his direction.



These Men Helped Solve the Telephone Problems of the Canal Zone. Left to Right: C. L. Bleakley, Supervisor of Telephone and Telegraph of the Panama Canal, F. Holmstrom, Jr., Manager Eastern Division, and W. A. Chapin, Sales Engineer, Automatic Electric Company, and W. L. Hersh, Electrical Engineer, Panama Canal

New System in Canal Zone

Automatic 3,000 Line Installation Ordered

By H. E. CLAPHAM

The Panama Canal Commission has placed orders with Automatic Electric Co. for conversion of the Canal Zone telephone system to Strowger Automatic operation. The initial installation will have a capacity of approximately 3,000 lines, distributed among the four central offices at Cristobal, Gatun, Pedro Miguel and Balboa.

An engineering utility of international importance, the Panama Canal always has been foremost in adoption of any development that means saving of time, reduction of errors or greater certainty in operation and administration. The possibilities afforded by automatic telephone service began to interest the administration years ago. In 1918 C. L. Bleakley, Supervisor of Telephone and Telegraph of the Panama Canal, which operates the Canal Zone telephone system for the Panama Railroad, paid a visit to the United States to study the various types of telephone systems. As a result of his investigations a fifty-line C-A-X was installed in 1919 at Gamboa, midway across the Isthmus, and at a later date P-A-X's were installed at Fort Clayton and Fort Davis. The zone's equipment had to be able to withstand the rather severe local climatic conditions; and operate faithfully at all times, regardless of humidity or temperature, but Strowger Automatic exchanges operate successfully in such other tropical countries as Cuba, Hawaii and the Philippines.

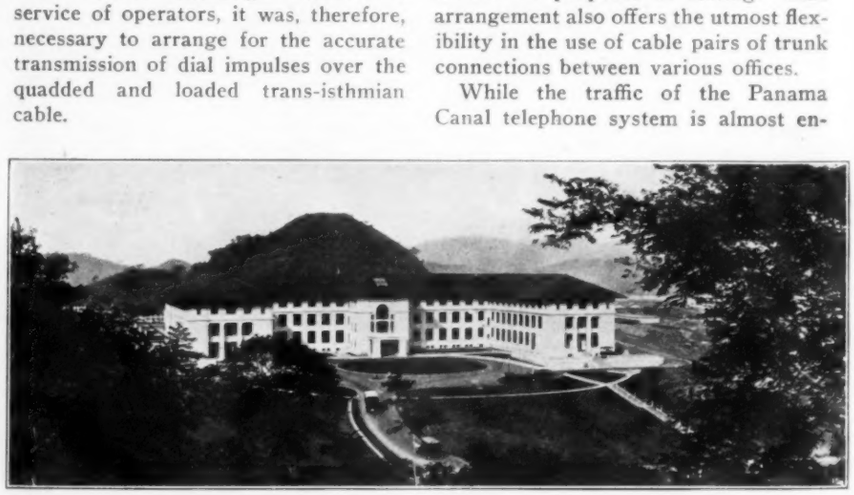
Charges for telephone and trunk service anywhere within the Canal Zone are such that the intercepting of calls for collection of tolls is unnecessary; thus the entire telephone system resolves itself into a four office network, arranged on a free service basis, and its operating territory extends the full length of the Canal. To carry traffic between exchanges without the service of operators, it was, therefore, necessary to arrange for the accurate transmission of dial impulses over the quadded and loaded trans-isthmian cable.

To demonstrate the ability of Strowger Automatic equipment to meet such conditions John Wicks, of Automatic Electric Co.'s development department, assembled some equipment and took it down to the zone, where its work was entirely satisfactory. The two problems being disposed of, specifications were drawn and contract awarded Automatic Electric Co., after mature consideration of all details, by the engineering and maintenance officials of the Canal, including Col. Walker, Engineer of Maintenance; W. L. Hersh, Electrical Engineer, and Mr. Bleakley.

The present telephone system of the Panama Canal is operated through four main exchanges, Cristobal and Gatun at the North or Atlantic end, and Balboa and Pedro Miguel at the South or Pacific end. The exchanges at Colon and Panama, both of which, although geographically within the Canal Zone, belong to the Republic of Panama, are operated as seperate properties by the Panama Telephone Co. The telephone system of the Canal Zone is operated primarily for the transaction of the official business of the various departments of the Panama Canal, the Panama Railroad, and the United States Army and Navy. Provision is also made for residential telephone service and for steamship agents and other commercial interests that carry on activities within the Canal Zone.

Traffic between the exchanges is carried over the fifty-pair cable which extends alongside the Panama Railroad from Balboa on the South to Cristobal on the North. This cable is carried underground in a four-cell, tile-duct line, except at the water crossings, where it is carried as an armored submarine cable. All of the wires of the cable are looped in and out of each of the four main exchanges, terminated on blocks at each place and cross connected for purposes of testing. This arrangement also offers the utmost flexibility in the use of cable pairs of trunk connections between various offices.

While the traffic of the Panama Canal telephone system is almost en-



Administration Building, Balboa, Canal Zone. An Automatic Telephone Switchboard Will Be Installed in the Top Floor of the Left Wing

tirely carried within the boundaries of the Canal Zone, the offices at Balboa and Cristobal are trunk-connected to the offices of the Panama Telephone Co. at Panama and Colon respectively. Traffic originating in the Canal Zone and destined for some point outside of it is handled without interception for toll or any other purpose. The Panama Telephone Co. collects tolls for calls originating in its system and destined for points within the Canal Zone, but the interception of such traffic is handled by the operators of that company.

The automatic system will provide for a continuance of the same general trunking arrangement, but none of the lines or trunks will be handled on a manual basis. The whole network will be technically similar to a Strowger Automatic multi-office network, with direct trunks between all of the four main offices. A universal directory will be issued and the numbering scheme will be on a four and five figure basis.

The largest exchange is at Balboa, where the Administration Offices of the Canal are located, and the automatic switching equipment for this office will be installed in that building. The initial installation for this office will consist of sixteen 100 line units. The exchange at Cristobal will have an initial installed capacity of 900 lines, and a new building will be erected there. At Gatun an automatic exchange will have an installed capacity of 300 lines.

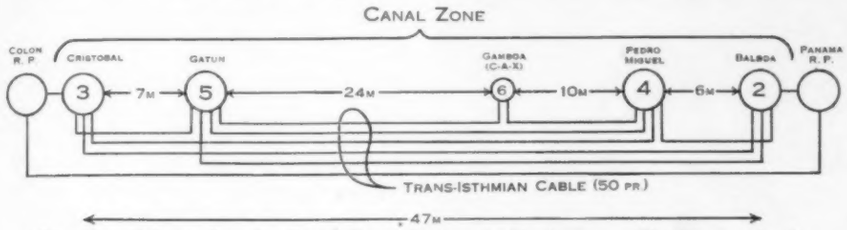
At Pedro Miguel the fourth automatic exchange will have an initial capacity of 300 lines.

All equipment will be similar in general character, the line switches being of the rotary type and the service including single line, P. B. X., and two party (divided ring). The exchanges at Pedro Miguel and Gatun will be normally unattended, being supervised by remote control from Balboa and Cristobal respectively.

For interchange of traffic between the Panama Canal system and that of the Panama Telephone Co., trunk service is arranged between Colon and Cristobal and between Panama and Balboa. Three of the trunks in the fifty-pair cable are rented to the Panama Telephone Co. for cross country service, leaving the remainder unhampered for Canal Zone use.

At the highest point of the Isthmus, Darien, is a large Naval radio station, operated over trunks of the transisthmian cable from Balboa and Cristobal.

It is expected that the automatics will be of great value to the Canal in increasing the service to shipping. The full automatic connections over the trunks will keep the personnel of the operating units at each point along the Canal informed at all times as to the needs of shipping passing through. A large part of the business of the Canal, both operation and administration, is handled by telephone.



Trunking Scheme for the Canal Zone Automatic Exchanges. The Figures in the Circles Refer to Selector Levels Used in Trunk Distribution

New Book on Long Distance Operating Rules

"Toll Reference and Text Book," United States Independent Telephone Association, Chicago. 250 pages; $2.50 per copy.

The United States Independent Telephone Association has just issued the "Toll Reference and Text Book," which was requested by the 1922 Convention, when an editing committee was appointed consisting of C. C. Deering of Des Moines, Ia., H. E. Bradley of Harrisburg, Pa., and Frank F. Newman of LaPorte, Ind. Miss Anne Barnes, traveling chief operator of the Iowa Independent Telephone Association; Miss Margerite Norris, chief operator of the LaPorte (Ind.) Telephone Co., and Miss Lillian A. Vavasour, Albany, N. Y., traveling chief operator of the New York State Telephone Association, prepared and edited the text, with the advice and assistance of the main committee. Before being printed, proof sheets were submitted to the Traffic Superintendents of the Class A, Independent companies for criticism, and suggestions for slight changes made by them were followed, so that the text as finally printed meets with the general approval of the Traffic Chiefs of the Independent toll line companies.

The book consists of about 250 pages, and covers standard operating practices, being suitable for use in both large and small toll offices. Companies handling Bell lines, as well as Independent lines, will find it complete and invaluable. Small offices doing but a limited amount of toll operating will find the information they want concerning classification of toll service, proper ticketing, standard phrases and codes and reports to subscribers. A unique marginal index and a complete alphabetical index make it possible to locate quickly any subject wanted. Printed on tough paper with a stout, flexible cover, the book is made to stand hard service. It is arranged in ten sections, as follows:

Sec. 1. Classes of Service and Toll Charges; Sec. 2. Tickets and Their Use; Sec. 3. Recorders' Text Book; Sec. 4. Outward Operators' Text Book; Sec. 5. Inward Operators' Text Book; Sec. 6. Reports to Patrons; Sec. 7. Routing Instructions; Sec. 8. Outward Operators; Timing, Supervising and Disconnecting; Sec. 9. Handling Tributary Traffic; Sec. 10. General Instructions Not Covered Elsewhere.

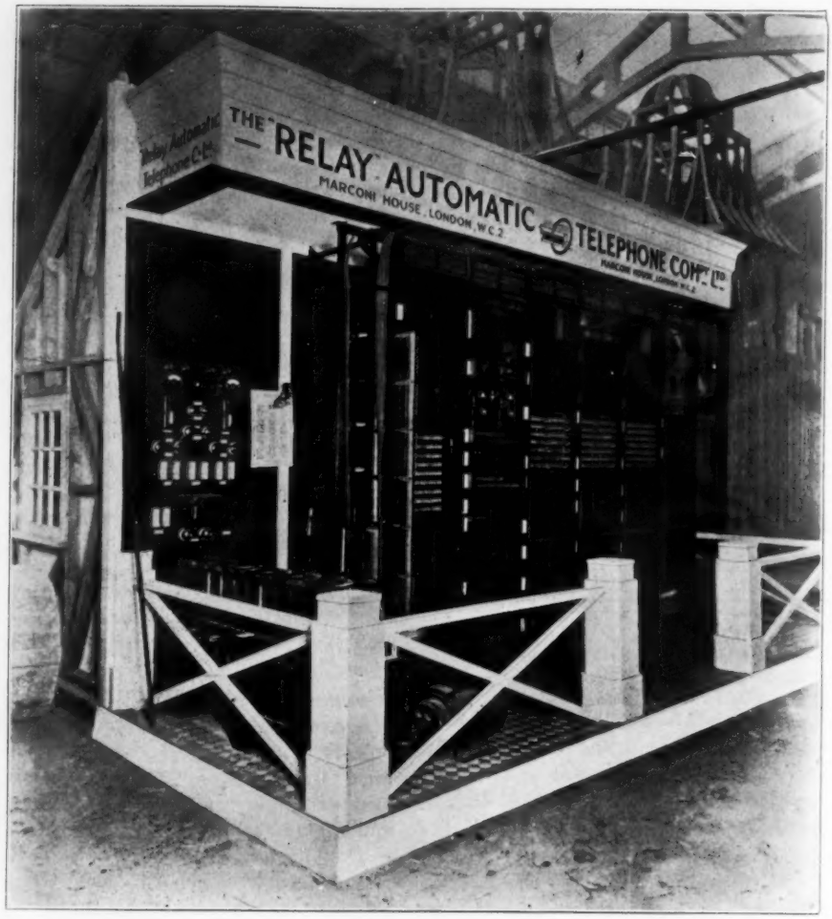
Where There's a Will, There's a House Organ—Holden's Stunt

Holden, Mo.—There are a lot of good house-organs in the telephone business, telling organization members and others "what it's all about," and to that class may now be added "The Transmigrater" issued "semi-Occasionally By, For, Of and To the Home Telephone Folks." The Transmigrater consists of two mimeographed sheets printed on both sides. Whoever bats out the copy for this little publication needs make no apologies. He—or she—puts as much of a punch of close-up interest and entertainment as there is in the old home town newspaper. This Holden idea is worth copying by many of the smaller companies who have begun to feel growing pains that call for internal publicity treatment.

New York Engineer Invents New Call Register

New York, N. Y.—A new registering apparatus to be used in connection with a telephone set has been invented by Benedetto Sapienza. The device requires no change in the wiring of the telephone set. A battery energizes the recorder. Calls made in absence of attendant at subscribing station are registered, so, according to the inventor, the subscriber may learn from the central station the numbers of those who called while the receiving station was unattended.

Greensboro, Ind.—Greensboro Cooperative Telephone company has been incorporated by C. R. Lee, E. M. Swain, R. O. McDaniel, Minton Stafford and Alton Evans. Capital is $10,000.



Relay Automatic Makes First Display at British Exposition

Deserved Its Honor

This "Relay" Automatic Telephone Makes History in Big British Exposition

Herewith is a photograph of the first stand erected at the great British Empire Exhibition, Wembley, England. This honor has fallen to the telephone world. The stand is in the building section of the Palace of Industry, and accommodates the 200-line "Relay" Private Automatic Telephone exchange which is giving the entire internal automatic service for the Exhibition's administration, as well as that of the Indian Empire, the Dominions and Colonies, and many large individual exhibitors.

This stand was erected December 1st, last, and ten days later the "exhibit" was erected and tested out with an initial equipment of 150 lines. The exchange is built up with a series of 10-line-5-link subscribers' groups, and the main distributing frame consists of two uprights equipped for 200 lines. The numbering scheme is on the 3-digit principle, 200-399. Three recorders have so far been fitted, but as the additional lines come into service, these will be extended to five, and the ten A. and B. feeds will be increased to seventeen. The marker group is already fitted for the ultimate of 200 lines. There is no ringing machine on this installation, the work being done by busy-back and pole-changer.

The power plant consists of combined motor-generator, having an input on the primary of 240 volts 50 cycles single phase, and an output on the secondary of 35 volts 10 amps. D. C. The power board is of the standard type used for "Relay" Private Automatic exchanges, and below is fitted control panel with voltage regulator for controlling the motor generator. Two sets of 24-volt batteries are provided, each consisting of 12 cells having a capacity of 48 ampere-hours, continuous rating discharge ten hours. The batteries are topped with "Blancol." The instruments are of the hand-combination and well-known British Post Office pedestal types, fitted with "Relay" dials.

This automatic switchboard has worked to its full efficiency without interruption through all of the construction conditions.

Lauds Telephone in Mines

West Virginia Mine Chief Tells of Rescue Work Help Given by Telephone Men

Charlestown, W. Va.—"The necessity of the modern telephone was never more apparent than in the recent deplorable mine disaster which happened at the Benwood Mill mine of the Wheeling Steel Corporation on the morning of April 28 at 7:05 o'clock." R. M. Lambie, chief of the West Virginia Department of Mines, says in commenting on the rescue work.

"The main entrance to the mine was completely destroyed which rendered it useless for exploration work. This transferred the scene of activity from the mine entrance at the mill to a new air shaft which had recently been completed. This shaft was located three miles from the hard road and had no telephone service, but within a few hours after the explosion a complete telephone service was installed, five sets being in use on top of the shaft in less than twenty-four hours after the explosion.

"Twenty-eight thousand feet of wire was hung in the mine, which was supervised by the Chesapeake and Potomac Telephone Co., and eight distinct telephone stations were established. In addition to this a portable set was always ready for use in emergency, as the men extending the wire were never more than five hundred feet behind the rescue crews who were using breathing apparatus in clearing out the dangerous gases. This telephone service was so complete that I could direct all phases of rescue work from any part of the mine.

"When it is understood that a fire was raging in the mine while the rescue work was going on, which had to be sealed up and the seals to be built were thousands of feet apart, it will be readily understood what efficient telephone service meant when any misunderstanding of orders might have created a condition which would have caused a second explosion. Personally, I know of no achievement comparable to the work performed by the linemen and the service given by the operators, for without this the recovery work would not have been carried out efficiently.

"When it is known that hundreds of men were employed in this mine during the twenty-four hours, on six-hour shifts, and one hundred and sixteen bodies were recovered without an injury to anyone or without a mishap of any kind due to orders being misunderstood, the people will realize just what part the modern telephone plays.

Our Literary Digest

Review of Recent Publications on Telephony and Allied Subjects

History of the Telephone and Telegraph in Chile, by Victor M. Berthold, American Telephone and Telegraph Co., New York.

This is the fourth of a series of monographs by Dr. Berthold, in which he gives the history of the development of the telegraph and telephone in other countries. It is devoted to the history of the telegraph and telephone in the Republic of Chile from 1851 to 1922. This progressive country was one of the first to adopt the telephone, the original promoter, Jose D. Husbands, having obtained rights to use the Edison telephone instruments in 1879. The first exchange in Valparaiso was in operation in 1881. The telegraph has been developed partly by the state and partly by private companies, while the telephone development has been almost entirely in the hands of private enterprise. At present, the Republic of Chile stands third in South America in telephone development having 0.7 telephones per 100 population. No small amount of labor must have been spent by the author in collecting the information in this book. It forms a valuable contribution to the history of the art's development in various parts of the world.

Storage Batteries, by George Wood Vinal, John Wiley and Sons, Inc., New York.

There has been a lack of a comprehensive treatise covering modern developments of the storage battery. The present volume, the author of which is Physicist at the National Bureau of Standards, will go far toward remedying this deficiency. It is comprehensive in that it treats the scientific principles, the materials and methods of construction, capacity and ratings, operation, testing and applications of the storage battery as it is used in the present day. Some of the material is necessarily technical but this material has been grouped in a way that will not lessen the value of the book for ordinary use.

Operating telephone men will be particularly interested in the chapter on operation and the discussion of telephone batteries in the chapter on present-day uses for Storage Batteries. In the chapter on operation are given methods of charging, descriptions of charging equipment, battery regulation, operating conditions, costs of operation, dismantling and reassembly and sources of trouble. The excellent typographical work and the subdivision of the subject matter under various topics and sub-headings not only make the book attractive but add much to its convenience for reference purposes.

Pennsylvania's Western District Meets July 17-19

Harrisburg, Pa.—The Annual Midsummer Convention and Operators Conference of the Western District of the Pennsylvania State Telephone and Traffic association will be held at Conneaut Lake Park, on July 17th, 18th and 19th.

An interesting program has been arranged and sessions will be held on Thursday afternoon and Friday and Saturday morning.

The Operators Conference will be held at the same time, but in separate meetings and each company is invited to send as many operators as possible.

Friday afternoon will be devoted to sports of various kinds. A banquet will be served in the evening.

A prize will be given to the Operating Telephone Man and to the Operator traveling the greatest distance to attend the convention, and for the "Golf Bugs" a prize for the lowest medal score for eighteen holes.

Franklin, Pa.—On June 23, the Petroleum Telephone company cut into service its new exchange. This new exchange is said by W. S. Paca, president of the company, to exhibit a complete array of modern telephone exchange equipment.

Issue 1924 Edition of Telephony's Directory

Within the past month subscribers and advertisers have received the 1924 edition of Telephony's Directory of the Telephone Industry. For 29 years this book has been the standard guide of its field, and each year it grows bigger and better. Telephony's Directory is a marvel of accurate information as regards the statistics and personnel of the telephone business—both Independent and Bell. It also is complete as regards the field's manufacturing interests, while its advertising pages are replete with the announcements of firms which sell to telephone companies. A copy of this directory should be in the office of every one who seeks telephone trade and in the library of every man actively engaged in the telephone business.

Crain's 1924 Market Data Book and Directory of Class, Trade and Technical Publications. Published by G. D. Crain, Jr., 537 Dearborn St., Chicago.

This book not only is valuable as a reference work on advertising, but on the whole structure of industry. In it are facts on a hundred industries, carefully indexed for reference purposes. Crain's Book also is of direct benefit to the business press, devoting a large part of its space to business papers.

Truscon Brings Out New Steel Pole

Youngstown, Ohio.—The Truscon Steel company's new steel pole department now is ready for a quantity production schedule and is prepared to manufacture all sizes of steel poles up to 50 ft. in length.

The company says, "A salient feature of the Truscon steel pole is its simplicity of construction, being pressed from 5-in. to 12-in. steel channels or I beams. It is so designed that no special equipment is needed by the lineman in ascending or descending, thus eliminating pole steps and the necessity for use of spurred climbers. The Truscon steel pole is made by pressing a portion of the web of the channel or I beam out to a predetermined angle, then riveting this pressed out section to a like section of another channel on I beam."

Due to simplification of manufacture and quantity production, cost of the steel pole is about the same as that of wood poles; in some sections of the country it is less.

Where more than ordinary strength of pole and extra length is required, the pole can be made in combinations of two or more, thereby giving a structure of great strength, suited to carrying long spans on transmission lines and other heavy duty.

A complete line of fittings has been designed for the steel pole to fit any size standard cross-arm, either wood or steel. The cost of these fittings, which will all be galvanized, is no more than the cost of ordinary through bolts used in general construction work, the makers claim.

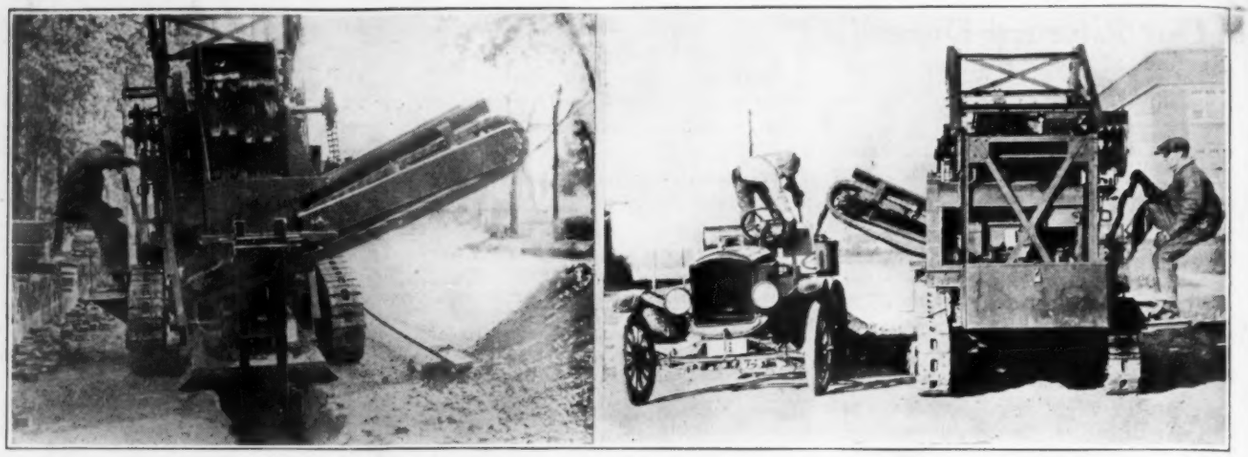
They also state that due to lack of pole steps and because of the sharp angles formed in joining the riveted web sections, it is impossible for any youngster or other person than a lineman to ascend the pole.

A circular giving data and other valuable information about the pole will be sent upon request.

Build Oil Country Exchange Complete in Seven Days

Cromwell, Okla.—Southwestern Bell men, in seven days, built and placed in operation the telephone exchange in the rapidly growing oil town of Cromwell. There were about 30 subscribers on the opening day. J. I. Cromwell, for whom the town was named, and R. J. Benzel, general manager of the Southwestern Bell, and other Southwestern Bell officials were present at the opening of the exchange.

Gallup, N. Mex.—J. B. Reynolds of Albuquerque, for many years with the Mountain States Telephone company, has purchased the local telephone plant.



At the left: the "business-end" of the Barber-Greene ditcher, showing the compactness of the outfit. At the right: the Barber-Greene ditcher loading into truck

Economizes with Ditcher

Barber-Greene Makes Telephone Special

Aurora, Ill.—A new type of a ditching machine has been developed by the Barber-Greene Co. of this city that is especially well received by telephone companies because of its ability to work speedily in small spaces, the versatility of its operations and all-around handiness in ditching work.

Photographs showing the machine in work were taken of a Barber-Greene ditcher in the service of the Wisconsin Telephone Co. Of this machine, its makers state:

"On August 4th, 1923, this company purchased a Barber-Greene ditcher, used it for some time and then purchased another one on November 7th, 1923. These machines they have used thruout the state, shipping them from one town to another. One machine worked in Madison first, was then sent to Eau Claire, and then sent to Hudson, and then to Kenosha and then to Milwaukee, etc.

"In addition to making great economies in getting out the dirt for conduit ditches it is possible also to eliminate any rehandling by loading direct from the ditcher conveyor into Ford trucks, the proportion of the amount which would be filled by the conduit.

"The Chesapeake & Potomac Telephone Company has developed this same method. They have an extension conveyor so that they are able to discharge into trucks even when the digging boom is lowered to the greatest depths.

"At Kenosha, one of the foremen said:

" 'The darn thing is almost human. When we come to a bad rock the machine keeps picking along at it until it loosens it. When we strike a pipe underground, the ditcher just catches a hold of it, and the safety release sprocket works; although we have struck a number of pipes, we haven't broken a single one of them. The ditcher seems to know the difference between hard digging and what it should not dig up.' "

"This is actual testimony from the man on the job. The safety release sprocket which makes this human-like performance possible was designed to replace a sprocket with a breaking pin with which Barber-Greene original machines were equipped. Two springs under compression in the sprocket maintained the normal stream of power. Any undue strain at the digging end overcomes the strength of the springs and the outer half of the sprocket slips around, coming back to normal again. If the strain is still present, the sprocket slips again. This procedure may be repeated indefinitely, until the stone or obstruction is dislodged or the operator becomes convinced that he has struck something which has to be dug out."

American Institute to Hold Big Exposition of Inventions

New York, N. Y.—An Exposition of Inventions will be held, December 8-13, 1924, in the Engineering Societies Building, New York City. The American Institute, of 47 W. 34th St., New York, handling this display through its Inventors' Section, has behind it an experience of ninety-six years in fostering American industrial life. Among inventions first displayed to the public at earlier All-American fairs of the Institute are the Morse telegraph, Hoe lightning printing press, McCormick reaper, Howe sewing machine, Bell telephone and Colt revolver.

Portsmouth (O.) Telephone Co. Buys Local Bell Plant

Portsmouth, O.—The Public Utilities Commission of Ohio has approved a purchase whereby the Portsmouth Telephone Co. of that state takes over the local plant of the Ohio Bell Telephone Co. Under this arrangement, Portsmouth telephone patrons will enjoy the advantages of but one local system and will gain excellent toll facilities to all points. Manager Harvey M. Allen and Superintendent C. W. Kugelman, of the purchasing company, are busy with details of the merger which will cover a number of points outside of Portsmouth and will call for the installation of a new toll board. The Portsmouth Telephone Co. was organized in May, 1899, and now has approximately 11,000 patrons. Mr. Kugelman has been with the company for over 21 years.

New Radio Tube Specification Adopted by U. S.

Washington, D. C.—The Government Interdepartment Radio Advisory Committee has adopted specifications for a new type of receiving tube to be used by the various departments and establishments. The specifications require a tube having somewhat the same electrical characteristics as the type WD-11 tube with a base that will fit the socket used for the UV-199 type. A special knife edge contact is provided. It will require a filament current of .25 amp. at 1.0 volts and will ordinarily use 60 volts on the plate.

Flat River (Mo.) Exchange Destroyed by Fire

Flat River, Mo.—Headquarters of the Lead Belt Telephone company here were recently destroyed by fire. The loss was estimated at $20,000. The entire Lead Belt system, consisting of 1,050 telephones, was put out of commission. Rebuilding is proceeding.

The Switchboard Comes to Life

Zero hour approaches. Wire chief and assistants are set for the "cut-over" that will bring a new central office into being.

In the room above operators sit at the new switchboard. Two years this equipment has been building. It embodies the developments of hundreds of engineers and incorporates the scientific research of several decades. Now it is ready, tested in its parts but unused as an implement of service.

In the terminal room men stand in line before frames of myriad wires, the connections broken by tiny insulators. Midnight comes. A handkerchief is waved. The insulators are ripped from the frames. In a second the new switchboard becomes a thing alive. Without their knowledge thousands of subscribers are transferred from the old switchboard to the new. Even a chance conversation begun through the old board is continued without interruption through the new. The new exchange provides for further growth.

This cut-over of a switchboard is but one example, one of many engineering achievements that have made possible a wider and prompter use of the telephone.

To-day, in maintaining a national telephone service, the American Telephone and Telegraph Company, through its engineering and research departments, continuously makes available for its Associated Companies improvements in apparatus and in methods of operation.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES
BELL SYSTEM
One Policy, One System, Universal Service

Re-Elect Keyes Chief

Sunnyside Man Made Washington State Association President for Third Time

Puyallup, Wash.—For the third consecutive term Edwin F. Keyes of Sunnyside was unanimously elected president of the Washington Independent Telephone Association. A. T. West, Spokane, was elected vice-president, and J. W. Baker, Spokane, secretar, at the organization's annual meeting held here June 18 and 19.

The collection policy of the Puget Sound Telephone and Telegraph company, as described in the paper "Some Phases of Commercial Practice," presented by the company's commercial manager, H. C. Allen, proved exceedingly interesting to the convention attendants.

Less than $130 a month is lost on uncollectible accounts by the Puget Sound company out of a total monthly billing of approximately $60,000. Only seven telephones a month out of a total of more than 16,000 subscribers are discontinued for non-payment of bills. The company sends a notice to all its delinquent subscribers on the 20th of the month, advising that if the bill is not paid by the 25th service will be discontinued.

On the 23rd, the party is telephoned and reminded again of the past due account.

If he still fails to remit, or set some definite time for payment, on the 25th of the month the chief operator or some designated assistant marks the multiple jacks on the switchboard and calls are not completed to that number. The subscriber is allowed outgoing service.

If, on the 18th of the month the bill still remains unpaid, the subscriber is advised that his telephone will be removed, and on the first of the month orders are originated instructing the plant department to remove the telephone. The order is a regular disconnect order except that it notes, for the information of the lineman, the amount of money the subscriber is required to pay in order to keep the telephone. The lineman, if he can, collects the money instead of removing the telephone.

The company makes a charge of 50 cents for restoring service if it is discontinued only by means of the board markings and is then paid up; it charges $1 for restoring service if a disconnect order is originated before the account is straightened up; and the regular service connection charge of $3.50 is charged if the telephone is actually removed.

No man owing a back bill can secure service in the territory where the company operates until he pays up in full.

A plea for consideration of the public utility commissions was made by Charles E. Wells, president of the Oregon Independent Telephone association, who counseled telephone companies to take due responsibility for rate increases or regulations and lay as little blame as possible at the door of the commissions. By blaming the commissions, so Mr. Wells stated, public confidence in the commissions was undermined. Functioning of the public service commission was detailed by J. W. Carey, chief engineer of the Washington State Department of Public Works.

St. Louis, Mo.—Southwestern Bell Telephone company plans the erection of the largest skyscraper in St. Louis. Cost is to be $8,000,000.

London, Eng.—Approximately £17,000,000 will be spent during the next two years for extending and reconstructing the English telephone system.

FORM 304

OUT

INDEPENDENT	A. T. & T.	STATE BELL	A	P	S	R	M	K	D	E	N

FROM

PLACE

TEL. NO. STATE

PERSON

TO

PLACE

TEL. NO. STATE

PERSON

FIRM ADDRESS

FILING TIME	REC.	CHARGE	$
PASSED	OPR.	M OVERTIME	
BEGAN	OPR.	MESSENGER	
ENDED	OPR.	REPORT CHARGE	
CHARGE QUOTED	CKT. NO.	APPOINTMENT	
TRUNK	RATE	OTHER LINE OR TAX	
		TOTAL	

Here Are Interesting New Style Toll Tickets

Olney, Ill.—The Suttle Equipment Co. has a new form of copyrighted toll ticket on the market which is receiving high commendation from its users.

Forms Nos. 303 and 304 are for small exchanges while Nos. 305 and 306 are for larger exchanges. Both forms make it possible to record all necesary information on a toll ticket without the use of several different kinds of stamps, and it is said that a toll operator can handle enough additional calls each day to pay for the tickets many times over.

The "in" tickets are same as "out" tickets, except wording in upper right corners.

FORM 306

OUT

FROM

PLACE

TEL. NO. STATE

PERSON

TO

PLACE

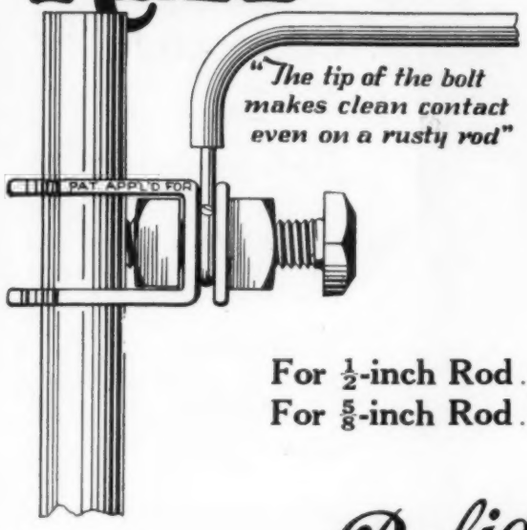
TEL. NO. STATE

PERSON

FIRM ADDRESS

INDEPENDENT		TIME STARTED		
A. T. & T.		TIME FINISHED		
STATE BELL		MINUTES	RATE	$
APPOINTMENT			OVER-TIME	
PERSON-TO PERSON		MESSENGER		
STATION-TO-STATION		REPORT CHARGE		
REPORT CHARGE		OTHER LINE		
MESSENGER		TAX		
COLLECT				
E D N		TOTAL		

KLING KLAMP FOR GROUND RODS



WHY *MONKEY* WITH SOLDERED RODS?

For ½-inch Rod . . . . . 15c each
For ⅝-inch Rod . . . . . 18c each

Quantity Discounts
100 lots—10%
1000 lots—20%

Reliable Electric Company
3145 Carroll Avenue, CHICAGO, U. S. A.

Durban to Have Automatic Telephones

Washington, D. C.—Conversion to automatic working of the whole Durban telephone system, in sections of 2,000 telephones a year, over a period of four years, has been approved by the Durban Town Council. The cost is estimated at £40,000 per annum. Durban is the only town in the Union in which the telephone system is owned and operated by the municipality, Assistant Trade Commissioner Vaughan reports to the Department of Commerce.

Automatic Gets Big Order for Sydney, Australia

Sydney, Australia.—Equipment for two automatic exchanges to care for 12,000 subscribers have been ordered by the Australian government from the Automatic Telephone Mfg. Co., Ltd., of Liverpool, England.

St. Petersburg, Fla.—Peninsular Telephone Co. is to erect a new exchange building.

Athens, Tex.—Approximately $100,000 will be spent by Athens Telephone Co. in rebuilding its exchange building.

R. J. Hoffman Elected Vice-President of Prest-O-Lite

New York, N. Y.—The Union Carbide and Carbon Corp. announces election of R. J. Hoffman as Vice President of The Prest-O-Lite Co., Inc.

Mr. Hoffman started with The Linde Air Products Company in 1914 as an engineer, at the East Chicago plant. He built and was appointed superintendent of the Linde Kansas City plant. After transfer to other more important oxygen plants, he became a district superintendent of plants, and later on in 1916 was appointed general superintendent of plants in charge of operations of all Linde and Prest-O-Lite gas plants.

R. J. HOFFMAN

During the war, when the Linde Company was given the job of producing helium for balloons and dirigibles, Mr. Hoffman moved to Fort Worth, Texas, to build a helium plant. Helium was produced on a quantity basis before the close of the war by this plant, this being the only successful performance of this character.

After completion of this job, Mr. Hoffman was promoted to the position of assistant works manager of Linde and Prest-O-Lite gas plants, and in 1918 was made works manager.

In January, 1921, he took charge of the operation of the big Speedway plant of The Prest-O-Lite Co., and as a result of his performance was later appointed general manager of the Speedway plant and the Battery and Small Tank Departments' sales and general operations.

Renewal of Chilean Concession Dependent Upon Improvement

Santiago, Chile.—The Chile Government has declared that it will renew the English company's telephone concession, which ends this year, only if a guarantee is given of an improvement of the services. Meanwhile a group of Chileans is organizing a company capitalized with 30,000,000 pesos and promising a modern service.

WANTED

A copy of TELEPHONE ENGINEER for September, 1922; also one for September, 1912. Will extend your subscription two months on receipt of either copy. TELEPHONE ENGINEER, 28 E. Jackson Blvd., Chicago

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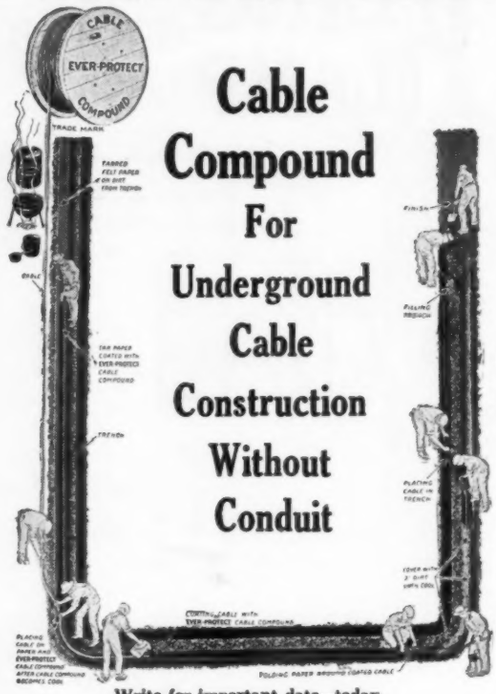

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Vermont Holds Successful Meet at Fairlee—Cushing Heads State

Fairlee, Vt.—Representatives of Vermont's 73 telephone companies took part in the Vermont Telephone association's most successful and biggest convention held here, June 20 and 21.

Brisk, practical discussion featured the plant sessions which considered matters of construction, operation, and maintenance from every angle. This department of the meeting was conducted by C. J. Knickerbocker of the Granville (N. Y.) Telephone company and C. L. Speare of the Orange County Telephone company of West Corinth, Vt.

First aid demonstrations were given by teams from White River Junction and Montpelier.

Fifteen papers were read before an assembly of 65 operators who attended the operators' conference. Miss Marion Willard of Rutland, was in charge of the conference.

J. G. Ihmsen, vice president and general manager of the Up-State New York association, F. W. Story, assistant to the vice-president of the New England Telephone and Telegraph company, and Miss Lillian Vavasour, also were featured speakers at the meeting.

Officers elected at the meeting: President, C. D. Cushing, Bethel; vice-president, C. L. Speare, West Corinth; secretary-treasurer, C. L. Ovitt, Enosburg Falls, and auditor, F. Harding Chesmore, Jonesville.

Directors in addition to the officers are: A. W. Foote, Middlebury; F. W. Story, Boston, Mass., and M. W. Hicks, Granville, N. Y.

Democratic Convention Demands Big Increase in Telephones

New York, N. Y.—More than 1,000,000 feet of telephone wire have been added by the New York Telephone company to the normal telephone facilities of Madison Square Garden, and the noted centers affected by the Democratic convention. A special system has been provided to serve almost 600 telephone lines of various classifications. To maintain these added telephone facilities, which include among other things 11 switchboard positions, 92 telephone booths, and 71 coin box telephones, a special force of operators and telephone men will be required.

Italian Ministry Borrows to Complete Milan Work

Milan, Italy.—Arrangements have been made for a loan of 5,000,000 lire by the city of Milan to the Italian Ministry of Posts and Telegraphs to complete the work already commenced of installing 14,000 automatic telephones in two important districts in the city. The Ministry had granted concession for this work to private interests, which were unable to complete the installation because the Ministry could not make partial payments as the work progressed. All revenue obtained from the telephones in question will be taken by the city of Milan until the loan has been paid. The arrangement is not incompatible with the general scheme under consideration by the Italian Government to re-lease all Government-owned telephone systems to private enterprise, says Commerce Reports.

New York, N. Y.—First quarter's A. T. and T. company report shows about $1,000,000 being spent on construction and replacements. Station gain is ahead of last year.

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Spain Names Commission to Study Private Ownership

Madrid, Spain—A concessionnaire company is to take over the Spanish telephone system, and a commission has been appointed, under the direction of the Director-general of Communications to study proposals and plans already submitted, or to be submitted, but no tenders are invited, the chief obligation being, where possible, the use of native material, the employment of the existing staff, and the payment of a yearly rent to the State.

Evidence of the general dissatisfaction with prevailing conditions in the telephone plants of Spain also is present in a statement made by U. S. Consul General Ralph J. Totten at Barcelona. He reports:

"The Barcelona Chamber of Commerce recently sent an energetic protest to the Subsecretario de Gobernacion at Madrid, concerning the lamentably poor conditions of the telephone service in Barcelona. The damage done by the heavy snow storm last February has never been completely repaired, to the great detriment of the local service, which has never been very good at the best.

"It is understood that representatives of an American corporation are considering the extension of telephone service in Spain and the installation of automatic telephones in the larger cities. Conferences are being held with Spanish financial interests to obtain the capital needed for the enterprise. The total project now considered will require a total capital of about 1,000,000,000 pesetas to be paid in at the rate of approximately 50,000,000 pesetas annually."

Henry Shafer Is Sales Manager of Premier Radio Division

Chicago, Ill.—Henry Shafer, one of the well known pioneers in the telephone industry, has been appointed sales manager of the radio department of the Premier Electric Co. He is noted for many practical achievements in the telephone and radio fields and has been delegated by the Chicago Department of Gas and Electricity to investigate and report upon radio inventions suitable for use by Chicago's fire and police departments.

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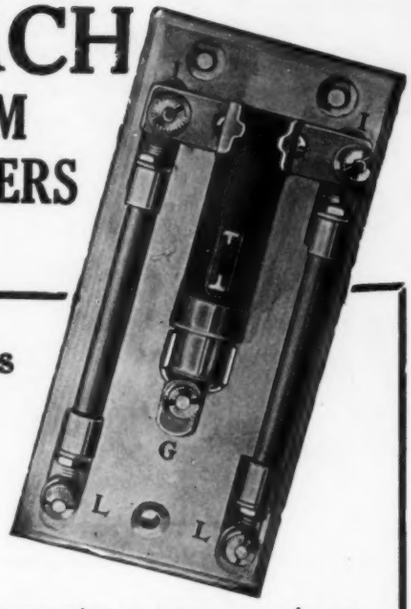

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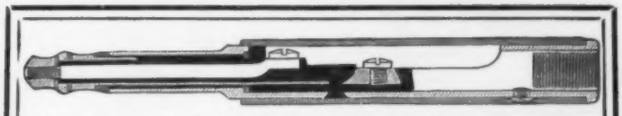

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Problems & Play Share Hoosier Attention at Wawasee

Wawasee, Ind.—A presentation of the customer-ownership financing plan in operation at Fort Wayne, given by Frank E. Bohn, vice president and general manager of the Fort Wayne Home Telephone and Telegraph company proved to be one of the high spots on the program of the annual convention of the Northern Indiana Telephone association held here.

Another practical feature was the round-table discussion of electrolysis of underground cable, led by J. W. Scott of Warsaw. Considerable interest was attached to this subject and many of the companies present had interesting experiences to relate. W. S. Vivian, head of the Public Relations department of the Midwest Utilities company spoke in an inspiring and practical way upon the development of a genuine service spirit in utility work.

Miss Margaret Norris conducted the operators' conference, with 70 operators from northern Indiana companies in attendance.

Holding the convention at a summer resort gave plenty of opportunity for play after the business sessions closed. Hugh Hogue, as head of the entertainment committee, was ring-master for a session of jollification.

The only dark spot in the convention was the absence of the association's president, Wilbur VanHorn, whom illness kept at home.

Officers elected for the ensuing year are: J. W. Scott, Warsaw, president; C. R. Stoops, Nappanee, vice-president; John Troyer, Elkhart, secretary-treasurer. Directors: Samuel Tomlinson and Wilbur VanHorn.

Chas. E. Tarte, Prominent Michigan Pioneer, Is Dead

Grand Rapids, Mich.—Charles E. Tarte, assistant chief engineer, Michigan Bell Telephone Co., died at Grand Rapids, recently. Mr. Tarte was born in Muskegon in 1869 and entered the telephone business as a boy, being employed by the Bell company in 1882, as night operator at Muskegon. Later he worked in Detroit, Minneapolis, St. Paul and Grand Rapids. In 1900 he became general manager of the Grand Rapids Citizens Telephone Co., returning to the Bell organization, as assistant chief engineer, upon the consolidation September 1, last. During the war he was in government communications service at Washington.